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FINAL REMEDIAL INVESITGATION/FEASIBILITY STUDY OPERABLE UNIT 23 (OU23) SITE 49 SUSPECTED MINOR DUMP SITE MCB CAMP LEJEUNE NC
8/1/2012
CH2M HILL

Final

Remedial Investigation/Feasibility Study
Operable Unit No. 23,
Site 49 - Suspected Minor Dump Site

Marine Corps Installations East - Marine Corps Base Camp Lejeune
Jacksonville, North Carolina

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NORTH CAROLINA
PROFESSIONAL
SEAL
ENGINEER
CHRISTOPHER F. BOZZINI

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Prepared by

CH2MHILL

Charlotte, North Carolina
North Carolina Engineering License #F-0699

Executive Summary

Introduction

This document presents the findings and conclusions of the Remedial Investigation (RI)/Feasibility Study (FS) conducted at Operable Unit (OU) Number 23 (OU 23), Site 49 – former Suspected Minor Dump located aboard Marine Corps Installations East- Marine Corps Base Camp Lejeune (MCIEAST-MCB CAMLEJ) in Jacksonville, North Carolina.

Site 49 consists of approximately 1 acre of land in an area of low topographic relief (approximately 2 to 6 feet [ft] above mean sea level [msl]) near the New River. This site is covered with a small maintained grassy area in the northern portion and a forested wetland bisected by a drainage feature in the southern portion. Building AS810, primarily used for storage, is located immediately northwest of the site. In general, storm water drains south and east to the drainage feature and wetland, which ultimately discharges to the New River.

Site 49 was first identified in the Initial Assessment Study (IAS) (Water and Air Research, Inc. [WAR], 1983) as the Marine Corps Air Station (MCAS) Suspected Minor Dump, where possible disposal of paint and potentially hazardous substances may have occurred. A Preliminary Assessment (PA)/Site Inspection (SI) was conducted from 2009 to 2010 to evaluate the presence and nature of environmental impacts to subsurface soil and groundwater that may have resulted from historical site use. Based on an evaluation of the subsurface soil and groundwater data, potential human health and risks were identified from exposure to volatile organic compounds (VOCs) in groundwater (CH2M HILL, 2011b).

An RI was recommended to identify the potential source of contamination, define the nature and extent of VOC contamination, evaluate fate and transport mechanisms, and assess human health and ecological risks.

Nature and Extent of Contamination

Based on the information presented in the RI, the horizontal and vertical extent of VOCs contamination at Site 49 has been adequately defined and is supported by the lines of evidence presented as follows:

- Concentrations of VOCs in surface soil did not exceed the residential Regional Screening Level (RSL), and only two VOCs exceeded their respective North Carolina Soil Screening Levels (NC SSLs) in one subsurface soil sample.
- One groundwater sample contained concentrations of 1,1,2,2-tetrachloroethane (PCA), trichloroethene (TCE), and vinyl chloride (VC) that exceeded their respective North Carolina Groundwater Quality Standards (NCGWQS). Groundwater samples collected from upgradient, cross-gradient, and deep monitoring wells did not contain concentrations of VOCs that exceeded the NCGWQS.
- Concentrations of VOCs detected in porewater samples were compared to the North Carolina groundwater (NCGWQS) and surface water quality (NCSWQS) standards. One porewater sample contained concentrations of 1,1,2,2-PCA and VC that exceeded the NCGWQS; however, these concentrations did not exceed the NCSWQS.
- Two VOCs were detected in the upstream surface water sample in concentrations exceeding their respective NCSWQS. However, midstream and downstream samples did not contain concentrations of VOCs that exceeded NCSWQS.
- Sediment samples did not contain concentrations of VOCs that exceeded comparison criteria.

Fate and Transport

Surface soil, subsurface soil, porewater, and surface water contaminants are isolated and were found in relatively low concentrations. Based on the physical and chemical properties of these contaminants, they are not expected to migrate and will likely degrade *in situ*.

Although concentrations of VOCs were detected in groundwater within the surficial aquifer, vertical migration of these contaminants is not occurring based on the low concentrations and upward vertical gradients. Thus, horizontal groundwater migration is the primary contaminant transportation pathway. Based on the lack of evidence for biodegradation, the primary contaminant degradation mechanisms are dilution and adsorption.

Human Health Risk Assessment

There were no unacceptable risks identified from current or future exposure to soil, surface water, or sediment. Additionally, no unacceptable risks were identified to industrial workers and construction workers from exposure to groundwater.

Due to the presence of VOCs in groundwater, potential future residential use of groundwater as a potable water supply may result in risk or hazards above the United States Environmental Protection Agency's (USEPA's) acceptable range. The residential land use scenario evaluated in this assessment is very conservative, since it is likely that current land use will not change. Additionally, groundwater at Site 49 is not a current potable source, and it is not expected to be used as a potable source in the future.

VOCs were detected in groundwater at concentrations above vapor intrusion (VI) groundwater screening levels (GWSLs) for an industrial building. However, there is no current building within 100 ft of the impacted groundwater. Therefore, the VI pathway is currently incomplete but would need to be re-evaluated if future land uses changes.

Ecological Risk Assessment

No constituents in site media were identified that are expected to a cause a significant risk to populations of ecological receptors at Site 49.

Feasibility Study

Based on the RI, potentially unacceptable risks were identified from future residential exposure to VOCs in groundwater and future exposure through a potential VI pathway if buildings are constructed onsite within 100 ft of the impacted groundwater.

The purpose of the FS was to identify the Remedial Action Objectives (RAOs) for groundwater at Site 49 and potential treatment technologies to satisfy these RAOs. The RAOs are as follows:

- Restore groundwater quality to meet NCDENR and federal primary drinking water standards, based on the classification of the aquifer as a potential source of drinking water (Class GA or Class GSA) under 15A North Carolina Administrative Code (NCAC) 02L.0201.
- Prevent exposure to constituents of concern (COCs) in groundwater and vapor intrusion from COCs in groundwater until such time as groundwater concentrations or vapor intrusions mitigation measures allow for Unlimited Use/Unrestricted Exposure.

The remedial alternatives discussed in the FS are presented as follows:

- Alternative 1 - No Action
- Alternative 2 – Monitored Natural Attenuation (MNA) and Land use controls (LUCs)
- Alternative 3 – Enhanced *in situ* Biodegradation (EISB) with LUCs and LTM
- Alternative 4 – Air Sparging (AS) with LUCs and LTM

A comparative summary of the compliancy, effectiveness, implementability, and cost for each alternative is presented in the following table:

CERCLA Criteria	**No Action** **(1)**	**MNA and LUCs** **(2)**	**EISB, LUCs, and LTM** **(3)**	**AS, LUCs, and LTM** **(4)**
Threshold Criteria				
Protection of human health and the environment	❍	●	●	●
Compliance with ARARs	❍	●	●	●
Primary Balancing Criteria				
Long-term effectiveness and permanence	❍	⭘	⭘	⭘
Reduction in toxicity, mobility, or volume through treatment	❍	❍	●	●
Short-term effectiveness	❍	⭘	⭘	⭘
Implementability	●	●	❍	❍
Present Worth Cost	$0	$167K	$355K	$463K

Ranking: ● High ⭘ Moderate ❍ Low
Rankings are provided as qualitative descriptions of the relative compliance of each alternative with the criteria.
ARAR = Applicable and Relevant or Appropriate Regulation

All alternatives, with the exception of no action, are protective of human health and the environment, comply with ARARs, and are effective in the long term. Alternatives 3 and 4 actively treat COCs in groundwater. Alternative 2 is easily implemented and has a moderate short-term effectiveness in terms of environmental impacts during execution and worker safety, whereas Alternatives 3 and 4 are more material-intensive and use heavy equipment, resulting in higher impacts to the environment and worker safety risks. Alternative 2 has the lowest cost, followed by Alternative 3 and 4.

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Acronyms and Abbreviations

$\delta^{13}C$	carbon 13 isotope ratios
°F	degree Fahrenheit
µg/kg	microgram per kilogram
µg/L	microgram per liter
$\mu g/m^3$	microgram per cubic meter
$^0/_{00}$	part per thousand
ADAF	age-dependent adjustment factor
AF	adherence factor
ARAR	Applicable and Relevant or Appropriate Regulation
AS	air sparging
ASTM	American Society for Testing and Materials
atm-m^3/M	atmosphere-cubic meter per mole
atm-m^3/M-K	atmosphere-cubic meter per mole per Kelvin
ATSDR	Agency for Toxic Substances and Disease Registry
Baker	Baker Environmental, Inc.
bgs	below ground surface
BTOC	below top of casing
cal/mol	calorie per mole
cal/mol-K	calorie per mole per Kelvin
Cal EPA	California Environmental Protection Agency
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cfm	cubic foot per minute
CFR	Code of Federal Regulations
CLEAN	Comprehensive Long-term Environmental Action—Navy
COC	constituent of concern
COPC	constituent of potential concern
Cr(III)	trivalent chromium
Cr(VI)	hexavalent chromium
CSF	cancer slope factor
CSIA	compound-specific isotope analysis
CSM	conceptual site model
CTE	central tendency exposure
CTO	Contract Task Order
CVOC	chlorinated volatile organic compound
days/year	days per year
DCA	dichloroethane
DCE	dichloroethene
DHC	*dehalococcoides*
DO	dissolved oxygen
DoD	Department of Defense
DOT	Department of Transportation
DPT	direct-push technology
DQO	data quality objective
DTSC	Department of Toxic Substance Control
EcoSSL	Ecological Soil Screening Level
EISB	enhanced *in situ* bioremediation

ELCR	excess lifetime carcinogenic risk
EPC	exposure point concentration
ERA	Ecological Risk Assessment
ESV	ecological screening value
Fe (II)	ferrous iron
Fe (III)	ferric iron
FMF	Fleet Marine Force
F_{oc}	fraction of organic carbon
FRB	Federal Remediation Branch
FS	Feasibility Study
ft	foot
ft^2	square foot
ft^3	cubic foot
ft/day	foot per day
ft/ft	foot per foot
ft/yr	foot per year
g/mole	gram per mole
GHG	greenhouse gas
GI	gastrointestinal
GIS	geographic information system
gpm	gallon per minute
GRA	General Response Action
GWSL	groundwater screening level
HEAST	Health Effects Assessment Summary
HHRA	Human Health Risk Assessment
HI	Hazard Index
HQ	Hazard Quotient
HSA	hollow-stem auger
IAS	Initial Assessment Study
IC	institutional control
ID	inner diameter
IDW	investigation-derived waste
IGI&S	Installation Geospatial Information and Services
IR	Installation Restoration
IRIS	Integrated Risk Information System
IUR	inhalation unit risk factor
K	Kelvin
K_d	distribution coefficient
kg	kilogram
K_h	Henry's Law Constant
K_{oc}	partition coefficient
L/day	liter per day
L/min	liter per minute
LTM	Long-term Monitoring
LUC	land use control
m^3/L	cubic meter per liter
MCAS	Marine Corps Air Station
MCIEAST-MCB CAMLEJ	Marine Corps Installations East- Marine Corps Base Camp Lejeune

MCL	maximum contaminant level
MF	modifying factor
mg/day	milligram per day
mg/kg	milligram per kilogram
mg/kg-day	milligram per kilogram per day
mg/L	milligram per liter
mg/m^3	milligram per cubic meter
MHSPE	Netherlands Ministry of Housing, Spatial Planning, and Environment
ml	milliliter
ml/g	milliliter per gram
MBTU	million British Thermal Units
MMOA	mutagenic mode of action
MPP	Master Project Plans
msl	mean sea level
mV	millivolt
NAD	North American Datum
NAIP	natural attenuation indicator parameter
NAPL	non-aqueous phase liquid
NAVD	North American Vertical Datum
NAVFAC	Naval Facilities Engineering Command
Navy	Department of the Navy
NCAC	North Carolina Administrative Code
NCEA	National Center for Environmental Assessment
NCDENR	North Carolina Department of Environment and Natural Resources
NCGWQS	North Carolina Groundwater Quality Standards
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NC SSL	North Carolina Soil Screening Level
NCSWQS	North Carolina Surface Water Quality Standards
NFA	no further action
NJDEP	New Jersey Department of Environmental Protection
NO_x	nitrogen oxides
NPL	National Priorities List
NRWQC	National Recommended Water Quality Criteria
NTU	nephelometric turbidity unit
NY EPA	New York Environmental Protection Agency
O&M	operations and maintenance
ORP	oxidation-reduction potential
OU	Operable Unit
OU 23	Operable Unit Number 23
PA	Preliminary Assessment
PCA	tetrachloroethane
PCE	tetrachloroethene
PM_{10}	particulate matter less than 10 micrometers in diameter
PPRTV	Provisional Peer Reviewed Toxicity Value
PRG	Preliminary Remediation Goal
PVC	polyvinyl chloride
RAGS	Risk Assessment Guidance for Superfund
RAIS	Risk Assessment Information System
RAO	Remedial Action Objective

RBC	risk-based concentration
RCI	reactivity, corrosivity, and ignitability
RD	Remedial Design
redox	oxidation-reduction
RfC	reference concentration
RfD	reference dose
RI	Remedial Investigation
RME	reasonable maximum exposure
ROD	Record of Decision
ROI	Radius of Influence
RSL	Regional Screening Level
SAP	Sampling and Analysis Plan
SI	Site Inspection
SLERA	Screening-level Ecological Risk Assessment
SOP	standard operating procedure
SO_x	sulfur oxides
SQL	sample quantitation limit
SSL	soil screening level
SU	standard unit
SVE	soil vapor extraction
SVOC	semivolatile organic compound
SWDA	Solid Waste Disposal Act
TAL	target analyte list
TCA	trichloroethane
TCE	trichloroethene
TCL	target compound list
TCLP	toxicity characteristic leaching procedure
TOC	total organic carbon
Trimatrix	Trimatrix Laboratories
UCL	upper confidence limit
UF	uncertainty factor
UFP	Uniform Federal Policy
USCS	Unified Soil Classification System
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
VC	vinyl chloride
VFA	volatile fatty acid
VI	vapor intrusion
VMP	vapor monitoring point
VOC	volatile organic compound
WAR	Water and Air Research, Inc.
WOE	weight-of-evidence

SECTION 1

Introduction

This report presents the results of a Remedial Investigation (RI)/Feasibility Study (FS) conducted at Operable Unit (OU) Number 23 (OU 23), Site 49, located aboard Marine Corps Air Station (MCAS) New River, Marine Corps Installations East- Marine Corps Base Camp Lejeune (MCIEAST-MCB CAMLEJ) in Jacksonville, Onslow County, North Carolina. This RI/FS Report was prepared under the Naval Facilities Engineering Command (NAVFAC), Mid-Atlantic Division, Comprehensive Long-term Environmental Action—Navy (CLEAN) 1000 Contract N62470-08-D-1000, Contract Task Order (CTO) WE36.

1.1 Objectives and Approach

The objectives of the RI were to:

- Assess the nature and extent of volatile organic compounds (VOCs)
- Evaluate potential risks to human health and ecological receptors
- Develop necessary site information for preparing the FS

The following field investigation activities were performed in accordance with standard methods and procedures detailed in the MCIEAST-MCB CAMLEJ Master Project Plans (CH2M HILL, 2008) (referred to herein as the Master Project Plans [MPP]) and the Site 49 Uniform Federal Policy (UFP)-Sampling and Analysis Plan (SAP) (CH2M HILL, 2011c):

- Collection of 12 surface soil samples
- Collection of 10 subsurface soil samples
- Installation of nine permanent groundwater monitoring wells and collection of groundwater samples
- Collection of three porewater samples
- Collection of three surface water samples
- Collection of six sediment samples

The objectives of the FS were to:

- Develop the Remedial Action Objectives (RAOs)
- Identify and screen technology types and processes
- Develop and evaluate remedial alternatives
- Define the Applicable and Relevant or Appropriate Regulations (ARARs)
- Perform individual and comparative analysis of the remedial alternatives

1.2 Report Organization

This RI/FS is composed of the following sections:

- **Section 1—**Introduction
- **Section 2—**Background
- **Section 3—**Field Activities
- **Section 4—**Nature and Extent of Contamination
- **Section 5—**Contaminant Fate and Transport
- **Section 6—**Human Health Risk Assessment
- **Section 7—**Ecological Risk Assessment
- **Section 8—**Remedial Action Objectives and Identification and Screening of Technologies
- **Section 9—**Development and Screening of Alternatives
- **Section 10—**Detailed Evaluation of Alternatives
- **Section 11—**References

Figures and tables referenced throughout the text are provided at the end of each section. Appendixes are provided at the end of the document.

SECTION 2

Background

This section presents a description of the Base and a summary of the Site 49 setting, history, and previous investigation activities and findings.

2.1 Facility-wide Demography and Land Use

MCIEAST-MCB CAMLEJ is composed of approximately 236 square miles of land in Onslow County, North Carolina, near the southern boundary of the City of Jacksonville. Jacksonville is the largest city near MCIEAST-MCB CAMLEJ and represents approximately half of Onslow County's population. The Base is bordered by the Atlantic Ocean to the east, United States Route 17 to the west and State Route 24 to the north. It is bisected by the New River, which flows into the Atlantic Ocean in a southeasterly direction (**Figure 2-1**). The Base consists of approximately 26,000 acres of water and 127,000 acres of terrestrial features. The ocean frontage of the Base is composed of a fragile barrier island system that is separated from the mainland by salt marshes, small bays, and the Intracoastal Waterway. The areas adjacent to the Base are generally rural.

MCIEAST-MCB CAMLEJ was commissioned in 1942 as a training area to prepare Marines for combat and is currently home to an active duty, dependent retiree, and civilian population of approximately 150,000 personnel. MCIEAST-MCB CAMLEJ provides housing, training facilities, logistical support, and administrative supplies for a Fleet Marine Force (FMF) unit and other assigned units.

Military training operations at the Base include 80 live-fire ranges, 32 gun positions, 48 tactical landing zones, and three Military Operation in Urban Terrain training facilities. In addition, the Base is bordered by approximately 11 miles of beach frontage capable of supporting amphibious operations.

2.2 Site Setting and History

Site 49 is located aboard MCAS New River, in the northwest portion of MCIEAST-MCB CAMLEJ (**Figure 2-1**). The site lies on the south bank of the New River, encompassing less than 1 acre and consisting of wooded wetland and maintained grass (**Figure 2-2**). The site is relatively flat, with elevations ranging from 2 to 6 feet (ft) above mean sea level (msl). The ground surface slopes gently to the New River to the east northeast and a local drainage feature to the southeast. The northern portion of Site 49 is maintained grass area. The southern portion of Site 49 consists of a forested wetland bisected by a drainage feature. A portion of surface water runoff from MCAS New River flows to the New River through a series of drainage channels that converge through the drainage feature that bisects the site. A jurisdictional wetland is present, surrounding the drainage feature as depicted on **Figure 2-2**.

A 4,350-square-foot (ft^2) metal-framed building (Building AS810) is located adjacent to the northern portion of the site and is used for storage. The remnants of a former structure are situated adjacent to the southwest corner of building AS810, and consist of a raised concrete pad that contains a central floor drain and several circular holes located along the side of the pad closest to building AS810.

A terra cotta pipe was observed ending in the New River near the southeast portion of the site, and this pipe appeared to be in line with the previously noted former structure. A probe rod and posthole digger was used to track the location and orientation of the drain pipe from the bank of the New River inland toward Building AS810. The drain pipe appeared to terminate in the wooded area approximately 60 ft inland from the bank of the New River. MCIEAST-MCB CAMLEJ does not have historical documentation regarding the use of the concrete pad, drains, or terra cotta pipe.

A review of historical aerial imagery from MCIEAST-MCB CAMLEJ Installation Geospatial Information and Services (IGI&S) and Existing Conditions Maps obtained from the MCIEAST-MCB CAMLEJ Technical Records Office indicate that building AS810 has been in use since the early 1950s. A 1957 Existing Conditions Map identifies Building 32 – "MACS-7 Motor Transport and Warehouse" located in the current position of Building AS810 (**Appendix A**). A

1979 Existing Conditions Map identifies Building AS810 as a storage building, consistent with its current usage. There is no historical documentation of the types of materials or equipment that were stored in Building AS810.

2.3 Previous Investigations

2.3.1 Initial Assessment Study

Installation Restoration (IR) Site 49 was first identified in the Initial Assessment Study (IAS) (Water and Air Research, Inc. [WAR], 1983) as the MCAS Suspected Minor Dump. The IAS included a review of historical records, site visits, and personnel interviews to identify potential sites that could pose a risk to human health and/or the environment as a result of past disposal practices. Site 49 was described as approximately 800 ft of shoreline along the New River where possible waste disposal that included paint, paint-related waste, and potentially hazardous substances may have occurred. The timeframe of the disposal activities was not specified in the report, and Site 49 was not recommended for further investigation because of the small quantity of waste reported.

2.3.2 Preliminary Assessment and Site Inspection

Based on the site's history as a suspected minor dump, a Preliminary Assessment (PA)/Site Inspection (SI) was conducted at Site 49 to confirm the no further action (NFA) recommendation in the IAS. The purpose of the PA/SI was to evaluate the potential presence and nature of environmental impacts that may have resulted from historical site activities through the collection of environmental samples, to assess the potential risks to human and ecological receptors, and to determine if additional investigation was warranted.

The PA/SI was conducted in two phases. In July 2009, eight subsurface soil and three groundwater samples were collected and analyzed for target analyte list (TAL) metals, target compound list (TCL) semivolatile organic compounds (SVOCs), and TCL VOCs. Based on the July 2009 analytical results, six additional groundwater samples were collected in February 2010 and analyzed for TCL VOCs only. A brief summary of the results is provided as follows.

Subsurface Soil

Only one of eight samples contained VOC concentrations (1,1,2,2-tetrachloroethane [PCA] at 2.42 micrograms per kilogram [µg/kg]) that exceeded project-specific screening criteria. No other VOCs were detected in the soil samples. One sample contained concentrations of two SVOCs (benzo(a)pyrene [500 µg/kg] and benzo(b)fluoranthene [430 µg/kg]) that exceeded project-specific screening criteria. Additionally, aluminum (12,700 milligrams per kilogram [mg/kg] to 17,000 mg/kg), arsenic (1.2J [indicating the analyte was detected but the value may not be precise or accurate] mg/kg to 6.80 mg/kg), total chromium (2.5J mg/kg to 27.8J mg/kg), iron (2,050J mg/kg to 18,400J mg/kg), and vanadium (40.6J mg/kg) were detected in the subsurface soil at concentrations exceeding project-specific screening criteria.

Initial Groundwater Evaluation-July 2009

Three VOCs (1,1,2,2-PCA [0.86J micrograms per liter (µg/L)], 1,1,2-trichloroethane [TCA] [0.37J µg/L], and vinyl chloride [VC] [0.93J µg/L]) and six metals (aluminum [3,810 µg/L to 39,400 µg/L], barium [3.4J µg/L to 6.8J µg/L], chromium [2.5J µg/L to 6.3J µg/L], cobalt [44.2 µg/L], iron [3,000 µg/L to 172,000 µg/L], and manganese [287 µg/L to 305 µg/L]) were detected at concentrations exceeding project-specific screening criteria in groundwater samples collected from temporary water table wells. The VOCs were detected in only one groundwater sample from one of the three wells.

Additional Groundwater Assessment-February 2010

Based on the presence of VOCs in groundwater exceeding the project-specific screening criteria, six additional temporary water table monitoring wells were installed and samples were collected for analysis of TCL VOCs. Analytical data indicated that nine VOCs (1,1,2,2-PCA [1.54 µg/L to 78.5 µg/L], 1,1,2-TCA [1.35 µg/L to 6.02 µg/L], 1,2-dichloroethane [DCA] [0.345J µg/L to 0.62J µg/L], benzene [0.543J µg/L to 2.47 µg/L], *cis*-1,2-dichloroethene [DCE] [76.5 µg/L to 155 µg/L], tetrachloroethene [PCE] [0.504J µg/L to 1.33 µg/L], trichloroethene [TCE] [8.81 µg/L to 276 µg/L], *trans*-1,2-DCE [22.3 µg/L to 108 µg/L], and VC [1.05 µg/L to 22.1 µg/L]) were detected.

Conclusions and Recommendations

The PA/SI concluded that the six metals detected in groundwater collected in July 2009 were attributed to site geology and not historical disposal practices at the site. However, potential human health risks were present due to potential exposure to VOCs (1,1,2,2-PCA, 1,1,2-TCA, 1,2-DCA, benzene, PCE, TCE, VC, and *trans*-1,2-DCE) in groundwater. No unacceptable risks resulting from exposure to subsurface soil were identified for human receptors. Potentially unacceptable ecological risks were based on the presence of VOCs in groundwater. Based upon the potential risks identified by the PA/SI, completion of an RI was recommended (CH2M HILL, 2011b).

2.4 Regional and Facility-wide Physiography and Climate

MCIEAST-MCB CAMLEJ is situated in the Tidewater region of the Atlantic Coastal Plain Physiographic Province, which stretches from Georgia to Long Island, New York. The Tidewater region is characterized by swampy areas of low relief, with elevations averaging approximately 20 ft above msl. The physiography of the area is typical of the Atlantic Coastal Plain, with stepped terraces consisting of wide, gently eastward-sloping plains separated by linear, steeper, northward- and eastward-facing scarps (**Figure 2-3**). The topography is characterized by low elevations and relatively low relief across MCIEAST-MCB CAMLEJ. The surface elevations range from sea level to approximately 70 ft above msl, with the majority of MCIEAST-MCB CAMLEJ ranging from 20 to 40 ft above msl. The relief between stream and interstream areas typically ranges from 20 to 30 ft, and the New River and its tributaries bisect the Base in a northwest-to-southeast alignment.

Climatic conditions in southeastern North Carolina and at MCIEAST-MCB CAMLEJ are characterized by mild winters and hot, humid summers. Average annual precipitation in the area is on the order of 50 inches. The average ambient air temperature is 63 degrees Fahrenheit (°F) (United States Department of Agriculture [USDA], 2002).

2.5 Geology and Hydrogeology

2.5.1 General Regional Geologic and Hydrogeologic Framework

MCIEAST-MCB CAMLEJ is underlain by an eastward-thickening wedge of marine and non-marine sediments ranging from early Cretaceous to Holocene in age. The wedge begins at the western boundary of the Atlantic Coastal Plain Physiographic Province, known as the Fall Line, and dips southeastward toward the coast. Along the coastline, several thousands of feet of interlayered and unconsolidated sediments are present. These sediments consist of gravels, sands, silts, and clays, as wells as calcareous clays, shell beds, sandstone, and limestone deposited over pre-Cretaceous crystalline basement rock. Within MCIEAST-MCB CAMLEJ, approximately 1,500 ft of a sedimentary sequence mantles the crystalline bedrock and includes seven aquifers (**Table 2-1**) and their associated confining units (less permeable beds of clay and silt), including the surficial, Castle Hayne, Beaufort, Peedee, Black Creek, and Upper and Lower Cape Fear aquifers (Cardinell, Berg, and Lloyd, 1993). Three of the lower Quaternary and upper Tertiary Formations (Yorktown, Eastover, and Pungo River) shown in **Table 2-1** are not present in the vicinity of MCIEAST-MCB CAMLEJ.

Interstream areas generally provide the recharge for aquifers within the Coastal Plain region (Heath, 1989). Discharge of groundwater from the Coastal Plain aquifer system is generally through streams, swamps, and lakes. Evapotranspiration from the vadose zone and upward leakage through confining units into streams, estuaries, swamps, and the Atlantic Ocean also contribute to groundwater discharge. Within MCIEAST-MCB CAMLEJ, the New River estuary serves as the principal discharge receptor for groundwater from the Castle Hayne aquifer (Harned et al., 1989).

2.5.2 Site-Specific Geologic and Hydrogeologic Framework

Site Geology

Site-specific geological information is available from boring logs for soil borings and monitoring wells installed to depths of up to 45 ft below ground surface (bgs). **Figure 2-4** shows the location of two mutually perpendicular geological cross-sections, depicted on **Figures 2-5** and **2-6**. Soil boring logs are provided in **Appendix B**.

The site is mantled by a thin layer of silty sand ranging from 0 to 3 ft in thickness that overlies a fine-grained deposit extending up to 15 ft bgs, consisting of clay and sandy clay, with isolated lenses of sand and woody debris and brick (primarily close to the shoreline of the New River). A layer of silty to clayey sand underlies the clay, ranging in thickness from 2 to 5 ft. Beneath this thin sandy layer lies a weakly cemented (carbonate) fine to coarse grained sand containing shells, roughly 35 ft in thickness. Beneath the cemented sand lies a silty sand.

Site Hydrogeology

Site-specific hydrogeologic information was derived from seven permanent monitoring wells screened in the unconfined surficial aquifer (IR49-MW01 through IR49-MW07) and two monitoring well screened in the upper Castle Hayne aquifer (IR49-MW08 and IR49-MW01IW). Water table elevations ranged from 1.97 to 2.88 ft above msl, as shown in **Table 2-2**. Groundwater in the surficial aquifer appears to flow to the east toward the New River and east-southeast toward the wetland and drainage feature (**Figure 2-7**).

Monitoring wells IR49-MW01, IR49-MW07, and IR49-MW08 were gauged at high and low tide to evaluate the potential influence that tidal fluctuations may have on the site hydrogeology (**Table 2-3**). Based on the measurements observed, the tidal range was negligible and tidal fluctuations in the New River do not significantly impact water levels.

Horizontal hydraulic gradients were calculated between monitoring wells IR49-MW05 and IR49-MW07 (0.0088 foot per foot [ft/ft]), IR49-MW07 and IR49-MW01 (0.0026 ft/ft), and IR49-MW05 and IR49-MW01 [(0.0065 ft/ft) **Table 2-4**]. As shown on **Figure 2-7**, these monitoring well pairs are located approximately parallel to the direction of groundwater flow. The geometric mean hydraulic gradient of the three wells is 0.0053 ft/ft.

With only two wells screened within the upper Castle Hayne aquifer, it is not possible to determine flow direction, although studies by others (Cardinell, 1992) indicate that the New River is a local receptor of groundwater discharging from the Castle Hayne aquifer. In general, groundwater from the upper Castle Hayne aquifer flows toward the New River at MCAS New River. The vertical hydraulic potential between IR49-MW07 and IR49-MW08 was calculated to be 0.004 ft/ft, upward from the upper Castle Hayne aquifer to the surficial aquifer.

In situ aquifer testing was conducted in monitoring wells IR49-MW01 through IR49-MW08, as described in Section 3.2.9. Hydraulic conductivity values ranged from 0.97 foot per day (ft/day) (IR49-MW07) to 1.41 ft/day (IR49-MW05), with a geometric mean of 1.18 ft/day (**Table 2-4**). Boring logs for the monitoring wells screened in the surficial aquifer show that the well screens are open to a mixture of formation materials, ranging from clays to coarse sands, with corresponding variations in hydraulic conductivity. Consequently, the values derived from the aquifer testing reflect a composite of the various aquifer materials.

Assuming an effective porosity of 0.2 for this material, seepage velocities were calculated based on the hydraulic gradients between IR49-MW05 and IR49-MW07, IR49-MW07 and IR49-MW01, and IR49-MW05 and IR49-MW01 (**Table 2-3**). The geometric mean seepage velocity ranged from 0.0126 ft/day (IR49-MW07) to 0.0620 ft/day (IR49-MW05).

No active public water supply wells are located within a 1,500 ft radius of Site 49, and the site is not located within a designated wellhead protection area.

TABLE 2-1
Hydrostratigraphic Units of the North Carolina Coastal Plain
Site 49 Remedial Investigation/Feasibility Study
MCIEAST-MCB CAMLEJ, North Carolina

Geologic Units			Hydrogeologic Units
System	**Series**	**Formation**	**Aquifer and Confining Unit**
Quaternary	Holocene/Pleistocene	Undifferentiated	Surficial Aquifer
	Pliocene	Pinehurst[1]	Yorktown confining unit[1]
		Waccamaw[1]	Yorktown Aquifer[1]
	Miocene	Yorktown[1]	Yorktown Aquifer[1]
			Pungo River confining unit[1]
Tertiary		Pungo River[1]	Pungo River Aquifer[1]
		Belgrade	Castle Hayne confining unit
	Oligocene	Belgrade	Castle Hayne confining unit
		River Bend	Castle Hayne Aquifer
	Eocene	Castle Hayne	Castle Hayne Aquifer

Notes:
[1] Geologic and hydrogeologic units not present beneath MCB CamLej.
Source: Modified from Harned et al., 1989.

TABLE 2-2

Groundwater Elevations

Site 49 Remedial Investigation/Feasibility Study

MCIEAST-MCB CAMLEJ, North Carolina

Monitoring Well	Top of Casing Elevation (feet msl)	Well Depth (feet bgs)	Measured Well Depth (feet BTOC)	Depth to Water (feet BTOC)	Groundwater Elevation (feet amsl)
IR49-MW01	6.45	16	18.92	4.33	2.12
IR49-MW02	4.35	16	16.00	2.38	1.97
IR49-MW03	6.76	16	15.91	4.33	2.43
IR49-MW04	4.78	16	16.31	1.90	2.88
IR49-MW05	5.72	16	18.85	3.08	2.64
IR49-MW06	4.80	16	19.18	2.61	2.19
IR49-MW07	5.87	19	22.51	3.67	2.20
IR49-MW08	5.80	40	43.50	3.50	2.30

Notes:
Water levels were measured on April 2, 2011
amsl - above mean sea level
BTOC - below top of casing

TABLE 2-3

Tidal Influences-Surficial Aquifer

Site 49 Remedial Investigation/Feasibility Study

MCIEAST-MCB CAMLEJ, North Carolina

Monitoring Well	Date	Time	Top of Casing Elevation (feet msl)	Well Depth (feet bgs)	Measured Well Depth (feet BTOC)	Depth to Water (feet BTOC)	Groundwater Elevation (feet amsl)
IR49-MW01	2/28/2012	0815	6.45	16	18.92	5.17	1.28
		1330				5.13	1.32
		1635				5.13	1.32
IR49-MW07	2/28/2012	0832	5.87	19	22.51	4.59	1.28
		1334				4.53	1.34
		1635				4.53	1.34
IR49-MW08	2/28/2012	0838	5.80	40	43.50	4.42	1.38
		1336				4.36	1.44
		1635				4.36	1.44

Notes:

amsl - above mean sea level

BTOC - below top of casing

TABLE 2-4

Surficial Aquifer Properties

Site 49 Remedial Investigation/Feasibility Study

MCIEAST-MCB CAMLEJ, North Carolina

Monitoring Well	Depth to Water (feet BTOC)	Top of Casing Elevation (feet amsl)	Water Elevation (feet amsl)	Distance Apart (feet)	Hydraulic Gradient (ft/ft)	Geometric Mean Hydraulic Gradient (ft/ft)	Geometric Mean K (ft/day)	V_s (ft/day)[1]
IR49-MW05	3.08	5.72	2.64	50	0.0088			
IR49-MW07	3.67	5.87	2.20					
IR49-MW07	3.67	5.87	2.20	30	0.0026	0.0053	1.18	0.031
IR49-MW01	4.33	6.45	2.12					
IR49-MW05	3.08	5.72	2.64	80	0.0065			
IR49-MW01	4.33	6.45	2.12					

Notes:
amsl - above mean sea level
ft/ft - foot per foot
ft/day - feet per day
BTOC - below top of casing
K=hydraulic gradient (ft/day)
V_s = seepage velocity (ft/day)
(1) Calculations based on assumed effective porosity value (0.2 sand with fines)

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Legend

- Approximate Location of Terra Cotta Pipe
- Drainage Feature
- Site Boundary
- Buildings
- Jurisdictional Wetlands

N

0 100 200 400 Feet

1 inch = 200 feet

Figure 2-1
Site Location Map
Site 49 Remedial Investigation/Feasibility Study
MCIEAST-MCB CAMLEJ
North Carolina

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Legend

- PA/SI Subsurface Soil Sample Locations
- PA/SI Temporary Well Locations
- Approximate Location of Terra Cotta Pipe
- Drainage Feature
- Buildings
- Site Boundary
- Historical Site Boundary
- Jurisdictional Wetlands

N

0 50 100 200 Feet

1 inch = 100 feet

Figure 2-2
Historical Sample Locations
Site 49 Remedial Investigation/Feasibility Study
MCIEAST-MCB CAMLEJ
North Carolina

CH2MHILL

Source: USGS Report by Cardinell, A.P., S.A. Berg, and O.B. Lloyd, Jr. (1993)

Figure 2-3
Physiographic Provinces of Eastern North Carolina
Site 49 Remedial Investigation/Feasibility Study
MCIEAST MCB CAMLEJ
North Carolina

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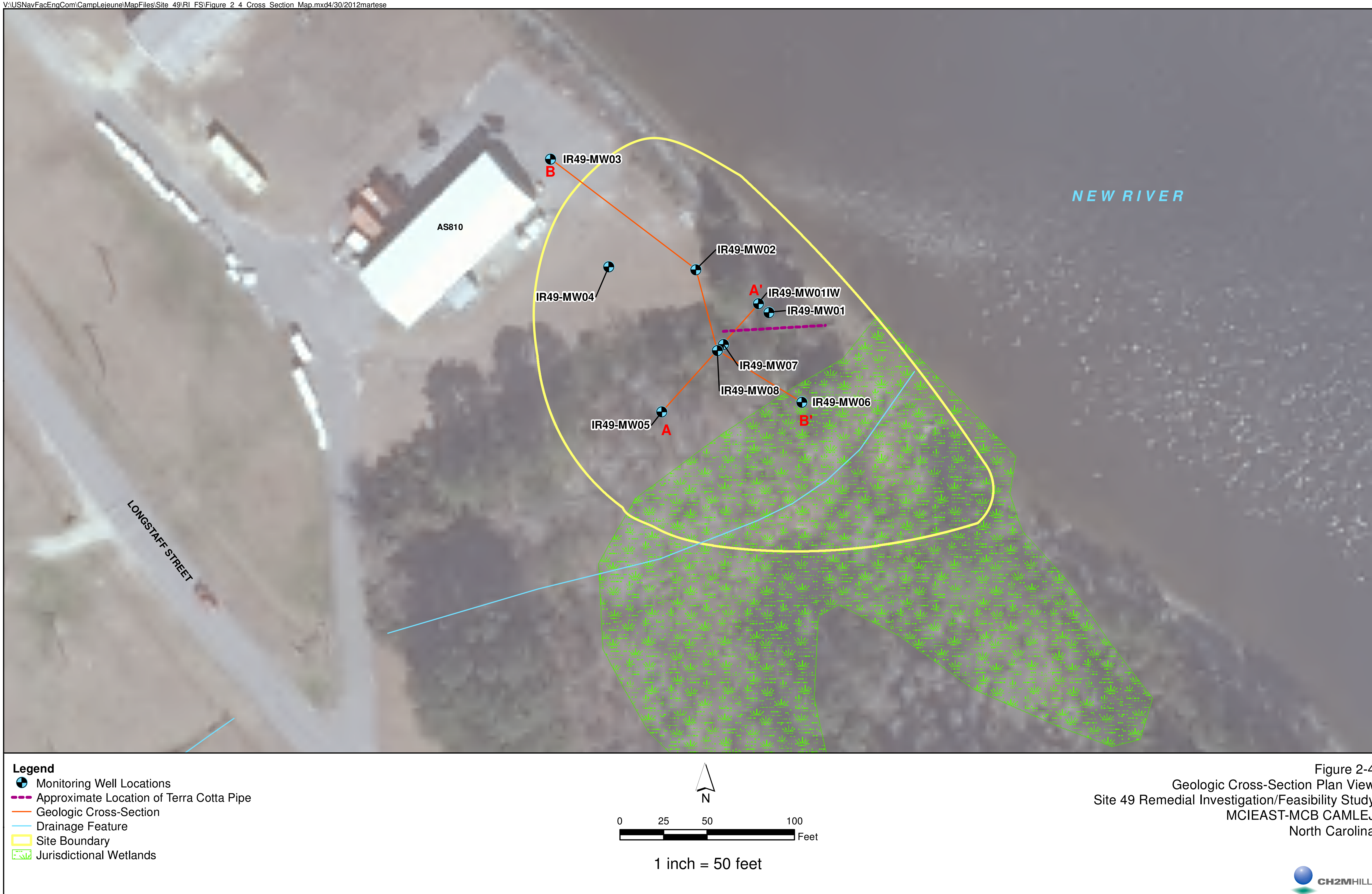

Figure 2-4
Geologic Cross-Section Plan View
Site 49 Remedial Investigation/Feasibility Study
MCIEAST-MCB CAMLEJ
North Carolina

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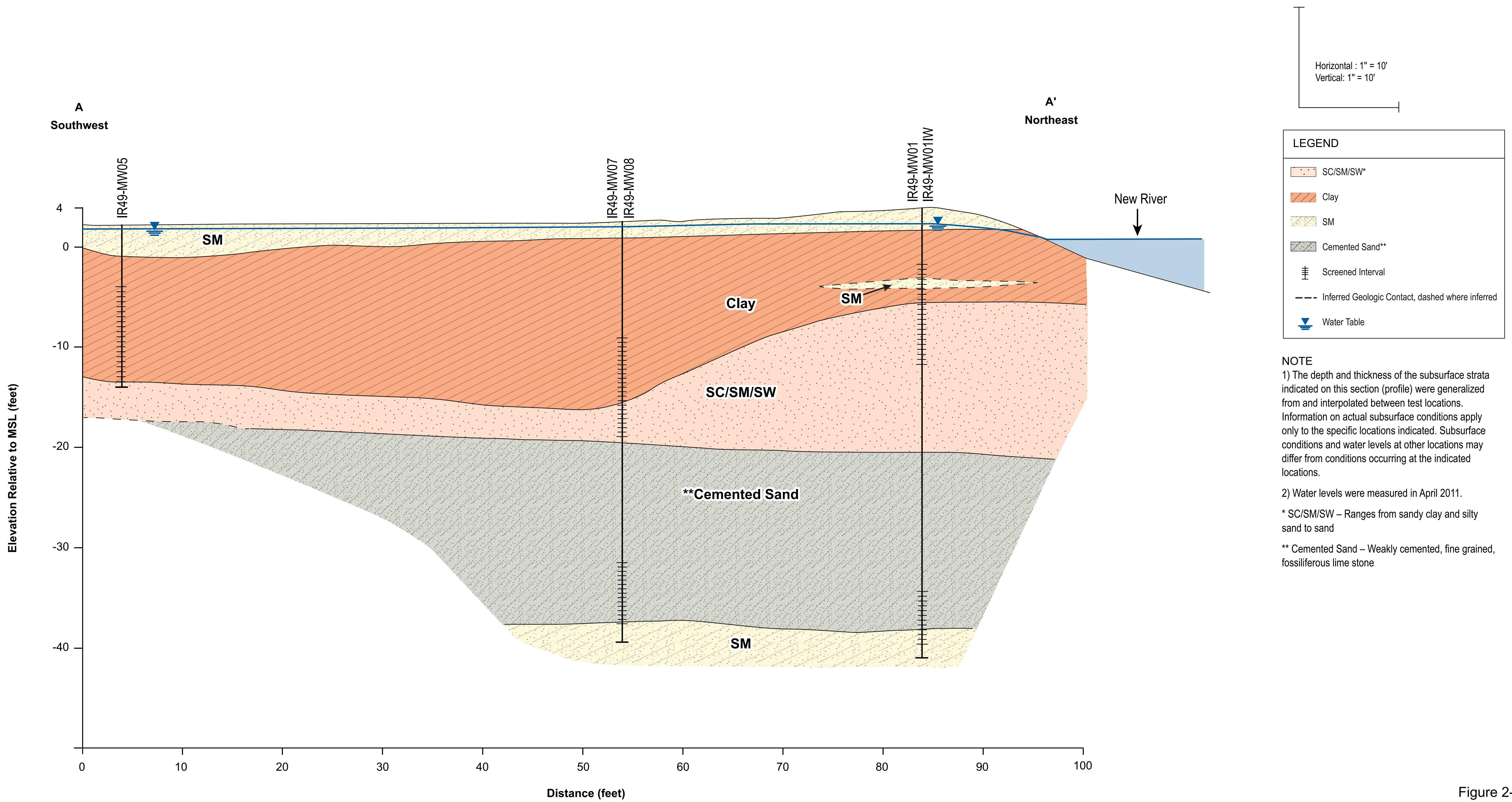

NOTE

1) The depth and thickness of the subsurface strata indicated on this section (profile) were generalized from and interpolated between test locations. Information on actual subsurface conditions apply only to the specific locations indicated. Subsurface conditions and water levels at other locations may differ from conditions occurring at the indicated locations.

2) Water levels were measured in April 2011.

* SC/SM/SW – Ranges from sandy clay and silty sand to sand

** Cemented Sand – Weakly cemented, fine grained, fossiliferous lime stone

Figure 2-5
Generalized Geologic Cross Section A-A'
Site 49 Remedial Investigation/Feasibility Study
MCIEAST MCB CAMLEJ
North Carolina

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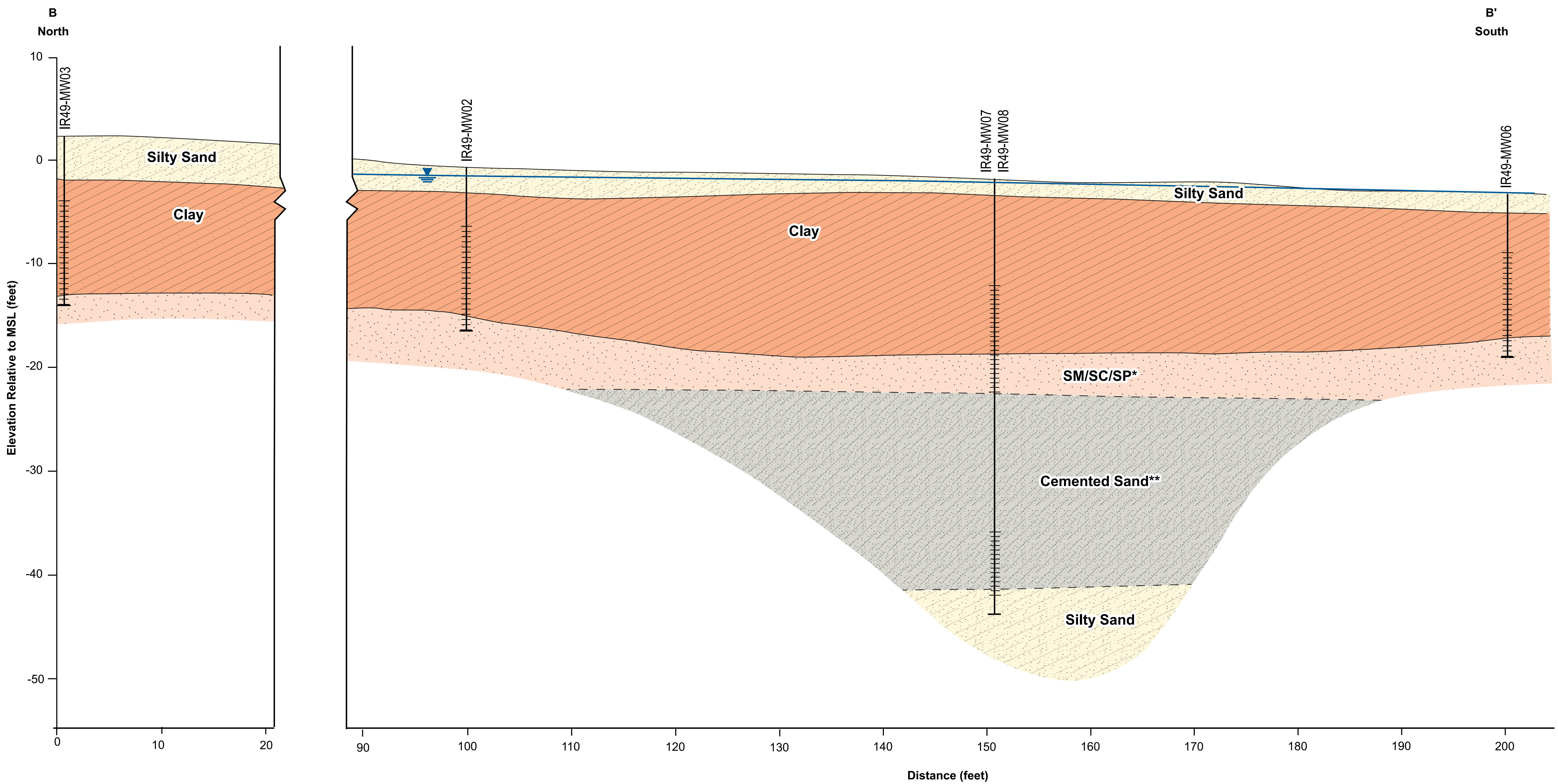

LEGEND

- SM/SC/SP*
- Clay
- Silty Sand
- Cemented Sand**
- Screened Interval
- Inferred Geologic Contact, dashed where inferred
- Water Table

NOTE

1) The depth and thickness of the subsurface strata indicated on this section (profile) were generalized from and interpolated between test locations. Information on actual subsurface conditions apply only to the specific locations indicated. Subsurface conditions and water levels at other locations may differ from conditions occurring at the indicated locations.

2) Water levels were measured in April 2011.

* SC/SC/SP – Ranges from sandy clay and silty sand to sand

** Cemented Sand – Weakly cemented, fine grained, fossiliferous lime stone

Horizontal : 1" = 10'
Vertical: 1" = 10'

Figure 2-6
Generalized Geologic Cross Section B-B'
Site 49 Remedial Investigation/Feasibility Study
MCIEAST MCB CAMLEJ
North Carolina

Legend

- Monitoring Well Locations
- Pore Water Sample Location
- Surface Water Sample Locations
- Sediment Sample Locations
- Approximate Location of Terra Cotta Pipe
- Drainage Feature
- Potentiometric Surface Contours
- Groundwater Flow Direction
- Site Boundary
- Buildings
- Jurisdictional Wetlands

Notes:
-Water level elevations are reported in feet above mean sea level Potentiometric surface contours have been interpolated between monitoring well locations. Actual conditions may differ from those shown on this figure.
-Water levels were measured on April 2, 2011
-Only monitoring wells used to generate the potentiometric surface are shown on this figure.
- 2.64 - Water level elevation

N

0 25 50 100 Feet

1 inch = 50 feet

Figure 2-7
Potentiometric Surface Map - Surficial Aquifer
Site 49 Remedial Investigation/Feasibility Study
MCIEAST-MCB CAMLEJ
North Carolina

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SECTION 3
Field Activities

The RI field activities were conducted from March 2011 through March 2012, in accordance with the standard operating procedures (SOPs) outlined in the Site 49 UFP-SAP (CH2M HILL, 2011c) and the MPP (CH2M HILL, 2008).

This section presents a summary of the field activities:

- Site preparation
- Environmental sampling:
  - Surface and subsurface soil
  - Groundwater
  - Porewater
  - Surface water
  - Sediment
- Aquifer testing
- Site surveying
- Investigation-derived waste (IDW) handling

3.1 Site Preparation

Prior to any intrusive field activities, the North Carolina One Call utility locating service was notified, and all underground utilities were located and marked within a 20-ft radius of each sampling location, and verified by a third-party subcontractor. Minor vegetation clearance was required to remove undergrowth from proposed sampling locations. In accordance with the MPP (CH2M HILL, 2008), all trees greater than 3 inches in diameter were avoided.

3.2 Environmental Sampling

The following sections describe sampling procedures employed during the RI field activities.

3.2.1 Surface Soil

Surface soil was not assessed during the PA/SI, and a source area was not identified. Consequently, 12 surface soil samples were collected from 0 to 2 inches bgs in a grid pattern (**Figure 3-1**). Prior to sample collection, organic debris was removed to expose the surface soil. Samples were collected using stainless steel spoons or trowels.

All samples were placed in laboratory-provided containers, preserved appropriately, and shipped on ice under chain-of-custody control to Trimatrix Laboratories (Trimatrix) of Grand Rapids, Michigan, for VOC analysis by United States Environmental Protection Agency (USEPA) Method 8260B and total organic carbon (TOC) analysis by Lloyd Khan.

3.2.2 Subsurface Soil

A total of six subsurface soil samples were collected, co-located with monitoring well locations, as shown on **Figure 3-1**. Six samples were collected using a decontaminated stainless steel hand auger from the interval approximately 1 ft above the water table. Because of the very shallow water table and the close proximity of wetlands, the majority of the samples were collected from between 1 and 3 ft bgs. The six samples were placed in laboratory-provided containers, preserved appropriately, and shipped on ice under chain-of-custody control to Trimatrix for VOC analysis by USEPA Method 8260B and TOC analysis by Lloyd Khan.

Additionally, to evaluate the grain size distribution of the aquifer materials observed within the screened interval, four subsurface soil samples were collected, IR49-MW01 (14 to 16 ft bgs), IR49-MW06 (14 to 15 ft bgs and 15 to 16 ft bgs), and IR49-MW08 (35 to 37 ft bgs). The samples were placed in laboratory-provided containers and shipped under chain-of-custody control to Trimatrix for grain size and hydrometer analysis by American Society for Testing and Materials (ASTM) Method D422-63.

3.2.3 Monitoring Well Installation

In order to assess groundwater quality and hydrogeologic properties, a total of nine monitoring wells were installed as shown on **Figure 3-1**. Monitoring well locations were strategically placed to evaluate the lateral and vertical extent of VOCs based on data from the 2009 PA/SI, and to assess Building AS810 and the terra cotta pipe as potential source areas.

Drilling

Seven soil borings (IR49-MW01 through IR49-MW07) were advanced to depths ranging from 16 ft bgs to 19 ft bgs using 4.25-inch inner diameter (ID) hollow-stem augers (HSAs), and two borings were advanced to 40 ft bgs (IR49-MW08) and 45 ft bgs (IR49-MW01IW) using a combination of 10.25-inch ID HSAs, 8.25-inch ID HSAs, and mud rotary drilling equipment operated by Parratt Wolff of Hillsborough, North Carolina. Split-spoon samples were collected from IR49-MW01 through IR49-MW08 using direct-push technology (DPT) equipment at 5-ft intervals, and continuous soil cores were recovered using DPT equipment from IR49-MW01IW. Samples were described using the Unified Soil Classification System (USCS) and screened for the presence of VOCs using a photoionization detector (PID). Boring logs are provided in **Appendix B**.

Well Installation and Construction

All wells were constructed using 2-inch ID Schedule 40 polyvinyl chloride (PVC) riser and 0.010-inch machine-slotted screen. The annular space surrounding the well screens was filled with 30/40 filter sand to at least 2 ft above the top of the screened interval. A bentonite seal approximately 2 ft in thickness was placed above the sand filter and allowed to hydrate prior to grouting. A cement-bentonite grout slurry was poured to within 2 ft of the ground surface.

The seven shallow monitoring wells were completed as single-cased Type II groundwater monitoring wells with a 10 ft screened interval. Two monitoring wells (IR49-MW08 and IR49-MW01IW) were constructed as a Type III (double-cased) well within the upper Castle Hayne aquifer. The initial boreholes were drilled to 22 ft bgs and 25 ft bgs using 10.25-inch and 8.25-inch ID HSAs (IR49-MW08 and IR49-MW01IW, respectively) to allow placement of a 6-inch ID steel isolation casing to prevent cross-contamination between the surficial and upper Castle Hayne aquifers during well construction. The casings were grouted in place from the bottom up using a tremie pipe inserted between the casing and annular space of the bore hole. After allowing the grout at least 24 hours to cure, a borehole was advanced through the each isolation casing using a $5^{7/8}$-inch tricone mud rotary drill bit and tooling monitoring. Monitoring well (IR49-MW08) was installed with a screened interval from 35 to 40 ft bgs, and IR49-MW01IW was installed with a screened interval from 40 to 45 ft bgs using the same procedures and materials as the shallow wells.

Monitoring wells located in the wooded area of the site were completed aboveground with a locking protective steel cover, concrete pad, and bollards. Monitoring wells located in the grass or asphalt areas were completed flush with the ground surface using an 8-inch diameter bolted manhole cover and concrete pad. Well construction diagrams are provided in **Appendix B**. Well construction details are summarized in **Table 3-1**.

Monitoring Well Development

Following installation, the monitoring wells were developed by surging and pumping with a submersible pump across the entire submerged screened interval. Water quality parameters were collected during purging to monitor the effectiveness of the development and to determine when the process could be terminated. Development was considered complete when visible sediment was removed or 1 hour of active pumping was completed, whichever was shorter in time.

3.2.4 Groundwater Sampling

The objective of the groundwater sampling effort was to collect samples using low flow/low stress procedures, and the effort was conducted using bladder pumps and peristaltic pumps. Wells that could not yield sufficient water to prevent excessive drawdown were purged using the well volume approach. Sampling flow rates ranged from 0.16 liter per minute (L/min) to 0.6 L/min, with an average of 0.4 L/min.

In April 2011, groundwater samples were collected from the monitoring wells IR49-MW01 though IR49-MW08.

Water quality parameters, including pH, temperature, conductivity, dissolved oxygen (DO), oxidation-reduction potential (ORP), and turbidity were monitored during the purging, and groundwater samples were collected after a minimum of one well volume had been removed and water quality parameters had stabilized for three consecutive readings. Stabilization criteria for each parameter were as follows:

- pH within 0.1 standard unit (SU)
- Temperature constant
- Conductivity within 3 percent
- ORP within 10 millivolts (mV)
- Turbidity less than 10 nephelometric turbidity units (NTUs) or within 10 percent

Samples were collected in laboratory-provided bottleware, preserved appropriately, and shipped on ice under chain-of-custody control to Trimatrix for VOC analysis by USEPA Method 8260B and TOC analyses by USEPA Method 9060.

In August 2011, groundwater samples were collected from IR49-MW01 through IR49-MW08 using the previously noted procedures. All groundwater samples were analyzed for VOCs by USEPA Method 8260B and natural attenuation indicator parameters (NAIPs), including: TOC, iron and manganese, alkalinity, methane, ethane, ethene, chloride, and sulfate. In addition, the sample collected from monitoring well IR49-MW01 was analyzed for *dehalococcoides* (DHC) and DHC functional genes and compound-specific isotope analysis (CSIA).

Samples intended for VOC and NAIP analyses were preserved appropriately and shipped on ice under chain-of-custody control to Trimatrix. Microbial samples were preserved appropriately and shipped on ice under chain-of-custody control to Microbial Insights of Rockford, Tennessee, and CSIA samples were preserved and shipped on ice under chain-of-custody control to Microseeps, Inc., of Pittsburg, Pennsylvania.

March 2012

In March 2012, a single groundwater sample was collected from newly installed monitoring well IR49-MW01IW, using the previously described low flow techniques. The groundwater sample was shipped on ice under chain-of-custody control to Trimatrix and analyzed for VOCs by USEPA Method 8260B.

3.2.5 Porewater

Porewater samples were collected from three locations near the southern shoreline of the New River (**Figure 3-1**) to assess the water quality of groundwater discharging to surface water.

Porewater sampling points consisted of a 2-inch ID Schedule 40 PVC casing with a 1-ft screened interval and a pointed end-cap that was manually driven into the sediment. The sample points were driven into the sediment so that the top of the screen was at least 2 inches below the sediment-water interface. The 2-inch casing was then purged until the water was visibly clear prior to installing an inner screen consisting of a 1-inch ID Schedule 40 PVC pipe with a 1-ft section of machine-slotted screen covered with a pre-packed filter composed of a wire mesh containing 30/40 filter sand.

Water inside the inner casing was purged with a peristaltic pump, and water quality parameters were measured and compared to adjacent surface water quality data. Once the purge was complete, porewater samples were collected using the straw method and placed into laboratory-provided containers, appropriately preserved, and shipped on ice to Trimatrix under chain-of-custody control for VOC analysis by USEPA Method 8260B and TOC analysis by USEPA Method 9060.

3.2.6 Surface Water

Three surface water samples were collected from the drainage feature that bisects Site 49 (**Figure 3-1**). Samples were collected at low tide by submersing new, unused polypropylene bailers into the water body and filling the laboratory-preserved bottles. Water quality parameters were measured prior to sample collection and are summarized as follows:

All samples were placed into laboratory-provided containers, preserved appropriately, and shipped on ice under chain-of-custody control to Trimatrix for VOC analysis by USEPA Method 8260B and TOC analysis using USEPA Method 9060.

3.2.7 Sediment

Six sediment samples were co-located by advancing a new, clean, 1.5-inch polyethylene sampler approximately 3 inches into the sediment. The sediment samples were co-located with the surface water and porewater samples (**Figure 3-1**). The sediment samples were placed in laboratory-provided containers, preserved appropriately, and shipped to Trimatrix for VOC analysis by USEPA Method 8260B and TOC analysis by Lloyd Khan.

3.2.8 Site Survey

All newly installed monitoring wells were surveyed by Lanier Surveying Company of Cedar Point, North Carolina (**Appendix C**). The locations were referenced both horizontally and vertically to permanent land monuments or a grid system. The survey controls were tied to a benchmark, the 1983 North American Datum (NAD), and the North American Vertical Datum (NAVD) of 1988. Ground surface and monitoring well top-of-casing vertical control were surveyed to the nearest 0.01 ft, and the horizontal control was surveyed to the nearest 0.10 ft. Each monitoring well top-of-casing was notched or otherwise marked to identify a constant measuring point for measuring depths to groundwater. Survey data are provided in **Table 3-1.**

3.2.9 Aquifer Testing

In April 2011, rising-head slug testing was conducted on all monitoring wells. The slug tests were accomplished by instantaneously lowering the water level in the well by the removal of a solid slug and recording the recovery of the water level to within 90 percent of the static water level. Changes in water level were measured by a pressure transducer and recorded by a datalogger. At least three tests were performed in each monitoring well. At the end of the testing, the raw data were downloaded, checked for completeness, and analyzed with Aqtesolv Version 4.0 aquifer test analysis software. Hydraulic conductivities were calculated using the Bouwer and Rice method. Slug test results are provided in **Appendix D.**

3.2.10 IDW Management

All IDW generated during the RI field activities was handled according to the MCIEAST-MCB CAMLEJ Waste Management Plan (CH2M HILL, 2011a. Soil cuttings, decontamination fluids, development water, and purge water was placed in Department of Transportation (DOT)-approved 55-gallon drums. Soil and water IDW was characterized by analyzing a composite sample of each media using the toxicity characteristic leaching procedure (TCLP) and reactivity, corrosivity, and ignitability (RCI) analysis (**Appendix E**). All media were non-hazardous.

IDW generated during the March 2011 field activities was transported to ECOFLOW, Inc., of Greensboro, North Carolina, for disposal. IDW generated during the February and March 2012 field activities was transported to American Environmental Services of Calvert City, Kentucky.

TABLE 3-1

Monitoring Well Construction Details

Site 49 Remedial Investigation/Feasibility Study

MCIEAST-MCB CAMLEJ, North Carolina

Well Identification	Date Installed	Northing Coordinate	Easting Coordinate	Top of Casing (feet msl)	Ground Surface (feet msl)	Top of screen (feet bgs)	Bottom of Screen (feet bgs)	Top of screen (feet msl)	Bottom of Screen (feet msl)
IR49-MW01	3/30/2011	3843836.028	277369.268	6.45	3.61	6	16	-2	-12
IR49-MW02	3/31/2011	3843843.488	277356.500	4.35	4.61	6	16	-1	-11
IR49-MW03	3/30/2011	3843862.667	277331.154	6.76	7.12	6	16	1	-9
IR49-MW04	3/30/2011	3843843.975	277341.295	4.78	4.95	6	16	-1	-11
IR49-MW05	3/31/2011	3843818.677	277350.541	5.72	2.57	6	16	-3	-13
IR49-MW06	3/29/2011	3843820.378	277375.012	4.80	1.81	6	16	-4	-14
IR49-MW07	3/31/2011	3843830.434	277361.297	5.87	2.74	9	19	-6	-16
IR49-MW08	3/31/2011	3843829.379	277360.283	5.80	2.87	35	40	-32	-37

Horizontal Datum: Universe Transverse Mercator (UTM) Zone 18 North, North American Datum of 1983 (NAD 83) (NSRS 2007) Meters

Control Reference: NC CORS NETWORK

Vertical Datum: North American Vertical Datum of 1988 (NAVD 88) Meters

msl - mean sea level

bgs - below ground surface

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Legend

- Surface Soil Locations
- Subsurface Soil Sample Locations
- Monitoring Well Locations
- Pore Water Sample Location
- Surface Water Sample Locations
- Sediment Sample Locations
- Approximate Location of Terra Cotta Pipe
- Drainage Feature
- Buildings
- Site Boundary
- Jurisdictional Wetlands

N

0 25 50 100 Feet

1 inch = 50 feet

Figure 3-1
Sample Locations
Site 49 Remedial Investigation/Feasibility Study
MCIEAST-MCB CAMLEJ
North Carolina

CH2MHILL

SECTION 4

Nature and Extent of Contamination

4.1 Data Presentation and Evaluation

4.1.1 Data Presentation

Analytical results from surface and subsurface soil, groundwater, porewater, surface water, and sediment sampling conducted during the RI field activities are provided in **Tables 4-1** though **4-6** and on **Figures 4-1** through **4-3**. Raw analytical data are provided in **Appendix E**.

4.1.2 Comparison Criteria

- **North Carolina Soil Screening Levels (NC SSLs)**—The Federal Remediation Branch (FRB) within the North Carolina Department of Environment and Natural Resources (NCDENR) Superfund Section of the Division of Waste Management is responsible for oversight of National Priorities List (NPL) sites and NPL-caliber sites under special agreements with the USEPA. The FRB provides the soil screening levels (SSLs) as guidelines for achieving criteria that are protective of groundwater.
- **USEPA Regional Screening Levels (RSLs)**—The USEPA Region 9 Preliminary Remediation Goals (PRGs) have been combined with similar risk-based screening levels used by Regions 3 and 6 into the RSLs for Chemical Contaminants at Superfund Sites table. The RSLs, adjusted for non-carcinogens to account for exposure to multiple constituents, are human-health-risk-based goals for assessing industrial and residential properties.
- **North Carolina Groundwater Quality Standards (NCGWQS)**— The State of North Carolina, through rules of Subchapter 2L of North Carolina Administrative Code (NCAC) Title 15A, establishes a series of classifications and water quality standards that are appropriate for the purpose of classifying groundwater in the state. NCGWQS are the maximum allowable concentrations of pollutants in groundwater that may be tolerated without creating a threat to human health or which would otherwise render the groundwater unsuitable for use as a drinking water source. The goal is to preserve and protect present and anticipated uses of groundwater.
- **Maximum Contaminant Level (MCL) for Groundwater**—MCLs are enforceable standards promulgated under the Safe Drinking Water Act for public water supplies consumed by a minimum of 25 persons. The MCLs are designed for the protection of human health, based on laboratory or epidemiological studies. They are designed to prevent adverse human health effects associated with a 70-year lifetime exposure for an average adult (70 kilograms [kg]) consuming 2 liters of water per day. Contaminants exceeding MCLs must be treated or removed from the public water supply prior to its potable use.
- **North Carolina Surface Water Quality Standards (NCSWQS)**— The State of North Carolina, through the rules of Subchapter 2B of the NCAC Title 15A, establishes a series of surface water classifications and standards that are used to determine whether the designated uses of a water body are being protected.

4.2 Sampling Results

4.2.1 Soil

Surface and subsurface soil analytical results are presented in **Table 4-1** and **Table 4-2,** respectively**.** The results were compared with the NC SSL and the adjusted residential and industrial soil RSLs. Surface and subsurface soil samples that contained concentrations of VOCs exceeding the comparison criteria are shown on **Figure 4-1**. VOCs detected in surface soil are isolated to one sample and have been laterally delineated. VOCs in subsurface soil are also isolated to a single sample and have been delineated. However, the location of the VOC detection is downgradient of the terra cotta drain pipe and co-located with a groundwater sample that contained similar VOCs indicating that the terra cotta pipe is a potential source. A summary of the results is presented as follows.

Surface Soil

Thirteen VOCs were detected at concentrations above laboratory reporting limits. Of these, 2-butanone, acetone, carbon disulfide, cyclohexane, methyl acetate, methylene chloride, and trichloroflouromethane are not site-related and are considered possible laboratory contaminants. Frequencies of detections and concentrations of the site-related contaminants are as follows:

- 1,1,2,2-PCA was detected in 1 of 12 samples at a concentration of 0.86J µg/kg (IR49-SS07)
- Benzene was detected in 1 of 12 samples at a concentration of 1.9J µg/kg (IR49-SS07)
- Ethylbenzene was detected in 1 of 12 samples at a concentration of 2.7J µg/kg (IR49-SS07)
- Toluene was detected in 2 of 12 samples with a maximum concentration of 3 µg/kg (IR49-SS07)
- TCE was detected in 2 of 12 samples with a maximum concentration of 4.7J µg/kg (IR49-SS07]

Only two VOCs (methylene chloride and TCE) were detected at concentrations that exceeded their respective NC SSLs. Methylene chloride was detected in the sample collected from IR49-SS08 (27J µg/kg) and IR49-SS12D (91 J µg/kg), exceeding the NC SSL of 1.3 µg/kg; however, as previously noted, methylene chloride is a known laboratory contaminant.

TCE was detected in the sample collected from IR49-SS07 (4.7J µg/kg) in exceedance of the NC SSL of 1.8 µg/kg. Concentrations of TCE in surface soil did not exceed the adjusted residential RSL. The extent of VOCs in surface soil has been defined and is limited to a single sample. This sample is delineated by IR49-SS04 (approximately 50 ft to the northwest), IR49-SS06 (approximately 50 ft to the southwest), IR49-SS10 (approximately 50 ft to the southeast), and the New River (approximately 25 ft to the northeast [**Figure 4-1**]).

Subsurface Soil

Eleven VOCs were detected at concentrations above laboratory method detection limits. Of these, 2-butanone, acetone, carbon disulfide, cyclohexane, methyl acetate, and methylcyclohexane are not site-related and are likely laboratory contaminants. Frequencies of detections and concentrations of the site-related contaminants are as follows:

- 1,1,2,2-PCA was detected in 2 of 6 samples with a maximum concentration of 1.1J µg/kg (IR49-SB10)
- 1,1,2-TCA was detected in 1 of 6 samples at a concentration of 1.9J µg/kg (IR49-SB01)
- Benzene was detected in 1 of 6 samples at a concentration of 1.8J µg/kg (IR49-SB13)
- Ethylbenzene was detected in 1 of 6 samples at a concentration of 3.3J µg/kg (IR49-SB13)
- Toluene was detected in 2 of 6 samples with a maximum concentration of 3.1J µg/kg (IR49-SB13)

Only two VOCs (1,1,2,2- PCA [2.1 µg/kg] and 1,1,2- TCA [1.9J µg/kg]) exceeded their respective NC SSLs (1.2 µg/kg and 1.6 µg/kg, respectively) in one subsurface soil sample (IR49-IS09). None of the detected concentrations of VOCs exceeded the adjusted residential RSLs. The extent of VOCs in subsurface soil has been defined and is delineated by IR49-IS10 (approximately 50 ft to the northwest), IR49-IS14 (approximately 50 ft to the southeast), IR49-IS09 (approximately 180 ft to the southwest), and the New River (approximately 25 ft to the northeast [**Figure 4-1**]).

4.2.2 Groundwater

Groundwater analytical results are presented in **Table 4-3**, and exceedances are shown on **Figure 4-2**. Results were compared to NCGWQS and adjusted tap water RSLs. Two groundwater sampling events were performed during the RI field activities (April and August 2011), and a single groundwater sample was collected from IR49-MW01IW in March 2012. A summary of the results is provided as follows.

April 2011

Twelve VOCs were detected at concentrations above laboratory reporting limits. Of these, chloroform and cyclohexane are not site-related and are possible laboratory contaminants. Frequencies of detections and concentrations of the site-related contaminants are as follows:

- 1,1,2,2-PCA was detected in 1 of 8 samples with a maximum concentration of 0.46J µg/L (IR49-MW01)

- 1,1,2-TCA was detected in 1 of 8 samples with a maximum concentration of 0.81J µg/L (IR49-MW01)
- Benzene was detected in 1 of 8 samples with a maximum concentration of 1 µg/L (IR49-MW01)
- *Cis*-1,2-DCE was detected in 7 of 8 samples with a maximum concentration of 70 µg/L (IR49-MW01)
- Isopropyl benzene was detected in 1 of 8 samples with a maximum concentration of 0.2J µg/L (IR49-MW03)
- Toluene was detected in 2 of 6 samples with a maximum concentration of 0.28J µg/L (IR49-MW01)
- *Trans*-1,2-DCE was detected in 2 of 9 samples with a maximum concentration of 19 µg/L (IR49-MW01)
- TCE was detected in 3 of 9 samples with a maximum concentration of 100 µg/L (IR49-MW01)
- VC was detected in 1 of 9 samples with a maximum concentration of 2 µg/L (IR49-MW01)

One groundwater sample (IR49-MW01) contained seven VOCs (1,1,2,2-PCA, 1,1,2-TCA, benzene, *cis*-1,2- DCE, *trans*-1,2-DCE, TCE, and VC) that exceeded the comparison criteria. Of these VOCs, concentrations of 1,1,2,2-PCA (1.0 µg/L), TCE (100 µg/L), and VC (2 µg/L) detected in IR49-GW01 exceeded their NCGWQS (0.2 µg/L, 3 µg/L and 0.03 µg/L, respectively).

Chloroform was detected at concentrations exceeding the adjusted tap water RSL (0.19 µg/L) in the groundwater samples collected from IR49-MW02, IR49-MW03, IR49-MW05, IR49-MW06, and IR49-MW08, ranging from 0.25J µg/L to 0.55J µg/L. However, as previously noted, chloroform is a common laboratory contaminant. Chloroform was not detected in any of the groundwater samples collected during the August 2011 or March 2012 monitoring events.

August 2011

Seven VOCs were detected at concentrations above laboratory reporting limits. Frequencies of detections and concentrations are as follows:

- 1,1,2,2-PCA was detected in 1 of 8 samples with a maximum concentration of 0.46J µg/L (IR49-MW01)
- Benzene was detected in 1 of 9 samples with a maximum concentration of 0.61J µg/L (IR49-MW01)
- *Cis*-1,2-DCE was detected in 6 of 9 samples with a maximum concentration of 42 µg/L (IR49-MW01)
- Toluene was detected in 2 of 6 samples with a maximum concentration of 0.2J µg/L (IR49-MW01)
- *Trans*-1,2-DCE was detected in 2 of 9 samples with a maximum concentration of 9.9 µg/L (IR49-MW01)
- TCE was detected in 3 of 9 samples with a maximum concentration of 58 µg/L (IR49-MW01)
- VC was detected in 1 of 9 samples with a maximum concentration of 1.4 µg/L (IR49-MW01)

The sample collected from monitoring well IR49-MW01 contained five VOCs (1,1,2,2-PCA, benzene, *cis*-DCE, TCE, and VC) that exceeded comparison criteria. Concentrations of 1,1,2,2-PCA (0.46 µg/L), TCE (58 µg/L), and VC (1.4 µg/L) exceeded the NCGWQS. The sample collected from monitoring well IR49-MW04 contained a J-flagged concentration of TCE that exceeded the adjusted tap water RSL.

March 2012

Concentrations of VOCs were not detected above the laboratory reporting limits in the groundwater sample collected from monitoring well IR49-MW01IW.

4.2.3 Porewater

Porewater analytical results were compared to the NCGWQS, adjusted Tap Water RSLs, and NCSWQS. Porewater analytical results are summarized in **Table 4-4**, and exceedances are shown on **Figure 4-2**

Nine VOCs were detected at concentrations above laboratory reporting limits. Of these, 2-butanone, acetone, carbon disulfide, methyl, and acetate are not site-related and are possible laboratory contaminants. Frequencies of detections and concentrations of the site-related contaminants are as follows:

- 1,1,2,2-PCA was detected in 1 of 3 samples at a concentration of 0.19J µg/L (IR49-PW01)
- *Cis*-1,2-DCE was detected in 1 of 3 samples at a concentration of 2.5 µg/L (IR49-PW01)
- *Trans*-1,2-DCE was detected in 1 of 3 at a concentration of 1.9 µg/L (IR49-PW01)
- TCE was detected in 1 of 3 samples at a concentration of 1.1 µg/L (IR49-PW01)
- VC was detected in 1 of 3 samples at a concentration of 0.3 µg/L (IR49-PW01)

The sample collected from IR49-PW01 contained a concentration of VC that exceeded the NCGWQS and adjusted tap water RSL (0.03 µg/L and 0.016 µg/L, respectively), and a concentration of 1,1,2,2-PCA that exceeded the adjusted tap water RSL of 0.2 µg/L. None of the porewater samples were reported to contain target analytes at concentrations that exceeded the NCSWQS.

4.2.4 Surface Water

Surface water analytical results are presented in **Table 4-5**. The results were compared with the NCSWQS for a Class SA saltwater waterway. Surface water samples that contained exceedances of comparison criteria are shown on **Figure 4-3.**

Three VOCs were detected at concentrations above laboratory detection limits. Of these, bromodichloromethane (1 µg/L) and dibromochloromethane (4 µg/L) were detected in the upstream sample (IR49-SW01) at concentrations exceeding their respective NCSWQS (0.55 µg/L and 0.4 µg/L). Concentrations of VOCs were not detected in samples collected from IR49-SW02 (midstream) or IR49-SW03 (downstream).

4.2.5 Sediment

Sediment analytical results were compared with the NC SSLs and adjusted residential and industrial soil RSLs. Sediment analytical results are provided in **Table 4-6**. Thirteen VOCs were detected at concentrations above laboratory detection limits, although there were no exceedances of comparison criteria.

4.3 Summary

Based on the previously presented information, the horizontal and vertical extents of VOCs have been adequately defined. A potential source of subsurface soil and groundwater impacts is likely the terra cotta drain pipe, located upgradient of IR49-IS09 and IR49-MW01.

- One VOC (TCE) exceeded the NC SSL in a single surface soil sample. However, concentrations did not exceed the residential RSL, and the lateral extent of VOCs in surface soil is limited to a single sample (IR49-SS07).
- Two VOCs (1,1,2,2-PCA and 1,1,2-TCA) exceeded their respective NC SSLs in one subsurface soil sample. The location of this soil sample coincides with the VOCs in groundwater at the site, and the lateral extent of VOCs in subsurface soil is limited to IR49-IS09.
- One groundwater sample contained concentrations of 1,1,2,2-PCA, TCE, and VC that exceeded their respective NCGWQS. Groundwater samples collected from upgradient, cross-gradient, and deep monitoring wells did not contain concentrations of VOCs that exceeded the NCGWQS.
- Concentrations of VOCs detected in porewater samples were compared to the North Carolina groundwater (NCGWQS) and surface water quality (NCSWQS) standards. One porewater sample contained concentrations of 1,1,2,2-PCA and VC that exceeded the NCGWQS; however, these concentrations did not exceed the NCSWQS.
- Bromodichloromethane and dibromochloromethane were detected in the upstream surface water sample at concentrations exceeding their respective NCSWQS. However, midstream and downstream samples did not contain concentrations of VOCs that exceeded NCSWQS.
- Sediment samples did not contain concentrations of VOCs that exceeded comparison criteria.

TABLE 4-1

Surface Soil Analytical Results

Site 49 Remedial Investigation/Feasibility Study

MCIEAST-MCB CAMLEJ, North Carolina

Station ID	**CLEAN NCSSLs (January, 2010)**	**Adjusted Industrial Soil RSLs**	**Adjusted Residential Soil RSLs**	IR49-SS02	IR49-SS03	IR49-SS04	IR49-SS05	IR49-SS06	IR49-SS07	IR49-SS08		IR49-SS09		IR49-SS10	IR49-SS11	IR49-SS12		IR49-SS13	
Sample ID				IR49-SS02-11A	IR49-SS03-11A	IR49-SS04-11A	IR49-SS05-11A	IR49-SS06-11A	IR49-SS07-11A	IR49-SS08-11A	IR49-SS08-11B	IR49-SS09-11A	IR49-SS09D-11A	IR49-SS10-11A	IR49-SS11-11A	IR49-SS12-11A	IR49-SS12D-11B	IR49-SS13-11A	IR49-SS13-11B
Sample Date				03/29/11	03/29/11	03/29/11	03/29/11	03/29/11	03/29/11	03/28/11	04/18/11	03/28/11	03/28/11	03/28/11	03/28/11	03/28/11	04/18/11	03/28/11	04/18/11
Chemical Name																			
Volatile Organic Compounds (µg/kg)																			
1,1,2,2-Tetrachloroethane	1.2	2,800	560	130 U	64 U	57 U	0.5 UJ	110 U	0.86 J	NA	82 U	79 U	82 U	63 U	150 U	410 U	230 U	NA	0.77 U
2-Butanone	16,000	20,000,000	2,800,000	130 U	64 U	57 U	7.3 J	110 U	15 J	NA	82 U	79 U	82 U	63 U	150 U	410 U	230 U	NA	0.77 R
Acetone	24,000	63,000,000	6,100,000	250 U	130 U	110 U	190 J	210 U	220 J	NA	160 U	230 U	170 U	170 U	300 U	810 U	470 U	NA	42 J
Benzene	2.6	5,400	1,100	63 U	32 U	29 U	0.5 U	53 U	1.9 J	NA	41 U	40 U	41 U	32 U	74 U	210 U	120 U	NA	0.77 U
Carbon disulfide	3,800	370,000	82,000	15 J	16 U	14 U	0.68 J	27 U	12 J	NA	20 U	11 J	9 J	9.5 J	37 U	45 J	58 U	NA	1.6
Cyclohexane	--	120,000	120,000	63 U	32 U	29 U	0.5 U	53 U	0.98 J	NA	41 U	40 U	41 U	32 U	74 U	210 U	120 U	NA	0.77 U
Ethylbenzene	780	27,000	5,400	63 U	32 U	29 U	0.5 U	53 U	2.7 J	NA	41 U	40 U	41 U	32 U	74 U	210 U	120 U	NA	0.77 U
Methyl acetate	--	29,000,000	7,800,000	470 J	290 J	210 J	2.1 J	330 U	0.49 UJ	NA	140 J	1,300	1,200	110 J	720 J	5,000	420 J	NA	0.77 U
Methylcyclohexane	--	--	--	31 U	16 U	14 U	0.5 U	27 U	1.1 J	NA	20 U	20 U	21 U	16 U	37 U	100 U	58 U	NA	0.77 U
Methylene chloride	1.3	53,000	11,000	34 U	19 U	15 U	1.5 U	29 U	3.3 U	NA	27 J	30 U	24 U	24 U	46 U	120 U	91 J	NA	0.77 U
Toluene	690	820,000	500,000	63 U	32 U	29 U	0.98 J	53 U	3 J	NA	41 U	40 U	41 U	32 U	74 U	210 U	120 U	NA	0.77 U
Trichloroethene	1.8	10,000	2,500	63 U	32 U	29 U	1.3 J	53 U	4.7 J	NA	41 U	40 U	41 U	32 U	74 U	210 U	120 U	NA	0.39 U
Trichlorofluoromethane (Freon-11)	24,000	340,000	79,000	63 U	39 J	29 U	0.25 U	53 U	0.25 UJ	NA	41 U	40 U	41 U	32 U	74 U	210 U	120 U	NA	0.39 U
Wet Chemistry																			
Total organic carbon (TOC) (mg/kg)	--	--	--	18,000	17,000	4,900	9,600	19,000	14,000	36,000	NA	34,000	NA	15,000	97,000	180,000	NA	33,000	NA

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Notes:

Bold box indicates exceedance of NC SSL

Bold text indicates exceedance of Adjusted Industrial Soil RSLs

Underline indicates exceedance of Adjusted Residential Soil RSLs

RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents

* - The MCL-Groundwater value is reported in place of the NCSSL where the MCL based SSL value is more conservative.

NA - Not analyzed

J - Analyte present, value may or may not be accurate or precise

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

mg/kg - Milligrams per kilogram

µg/kg - Micrograms per kilogram

MCL- maximum containment level

mg/kg – milligrams per kilogram

NC SSL – North Carolina Soil Screening Level

RSL – Regional Screening Level

TABLE 4-2

Subsurface Soil Analytical Results

Site 49 Remedial Investigation/Feasibility Study

MCIEAST-MCB CAMLEJ, North Carolina

Station ID	CLEAN NCSSLs (January, 2010)*	CLEAN RSLs Industrial Soil Adjusted 0511	CLEAN RSLs Residential Soil Adjusted 0511	IR49-IS09	IR49-IS10	IR49-IS11	IR49-IS12	IR49-IS13		IR49-IS14
Sample ID				IR49-SB09-3-4-11A	IR49-SB10-3-4-11A	IR49-SB11-2-3-11A	IR49-SB12-1_5-2-11A	IR49-SB13-1_5-2-11A	IR49-SB13D-1_5-2-11A	IR49-SB14-0_5-1-11A
Sample Date				03/31/11	03/31/11	03/31/11	03/31/11	03/31/11	04/01/11	03/31/11
Chemical Name										
Volatile Organic Compounds (µg/kg)										
1,1,2,2-Tetrachloroethane	1.2	2,800	560	2.1	1.1 J	0.53 U	0.42 U	0.49 UJ	59 U	0.53 UJ
1,1,2-Trichloroethane	1.6	680	160	1.9 J	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U
2-Butanone	16,000	20,000,000	2,800,000	0.51 R	0.51 R	2.4 J	0.42 R	6.4 J	56 J	2.2 J
Acetone	24,000	63,000,000	6,100,000	11 R	12 R	46 J	12 R	35	120 U	48 J
Benzene	2.6	5,400	1,100	0.51 U	0.51 U	0.53 U	0.42 U	1.8	30 U	0.53 U
Carbon disulfide	3,800	370,000	82,000	0.22 J	0.21 J	0.46 J	0.27 J	1.2	7.1 J	0.4 J
Cyclohexane	--	120,000	120,000	0.51 U	0.51 U	0.53 U	0.42 U	0.63 J	30 U	0.53 U
Ethylbenzene	780	27,000	5,400	0.51 U	0.51 U	0.53 U	0.42 U	3.3	30 U	0.53 U
Methyl acetate	--	29,000,000	7,800,000	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	120 J	0.53 U
Methylcyclohexane	--	--	--	0.51 U	0.51 U	0.53 U	0.42 U	1 J	15 U	0.53 U
Toluene	690	820,000	500,000	0.51 U	0.51 U	0.53 U	0.42 U	3.1	30 U	0.34 J
Wet Chemistry										
Total organic carbon (TOC) (mg/kg)	--	--	--	5,200	1,600	1,300	1,500	1,600	NA	8,400

Notes:

Bold box indicates exceedance of NC SSL

Bold text indicates exceedance of Adjusted Industrial Soil RSLs

Underline indicates exceedance of Adjusted Residential Soil RSLs

* - The MCL-Groundwater value is reported in place of the NCSSL where the MCL based SSL value is more

RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents

NA - Not analyzed

J - Analyte present, value may or may not be accurate or precise

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

mg/kg - Milligrams per kilogram

µg/kg - Micrograms per kilogram

TABLE 4-3

Groundwater Analytical Results

Site 49 Remedial Investigation/Feasibility Study

MCIEAST-MCB CAMLEJ, North Carolina

Station ID	**NCGWQS (January, 2010) ***	**Adjusted Tap Water RSLs (October, 2011)**	IR49-MW01			IR49-MW02		IR49-MW03		IR49-MW04		IR49-MW05	
Sample ID			IR49-GW01-11A	IR49-GW01-11C	IR49-GW01D-11C	IR49-GW02-11A	IR49-GW02-11C	IR49-GW03-11A	IR49-GW03-11C	IR49-GW04-11A	IR49-GW04-11C	IR49-GW05-11A	IR49-GW05-11C
Sample Date			04/01/11	08/04/11	08/04/11	04/01/11	08/03/11	04/02/11	08/04/11	04/01/11	08/03/11	04/01/11	08/03/11
Chemical Name													
Volatile Organic Compounds (µg/l)													
1,1,2,2-Tetrachloroethane	0.2	0.067	**1**	**0.46 J**	**0.46 J**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-Trichloroethane	5	0.042	**0.81 J**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Benzene	1	0.41	**1**	**0.61 J**	**0.62 J**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloroform	70	0.19	0.5 U	0.5 U	0.5 U	**0.25 J**	0.5 U	**0.55 J**	0.5 U	0.5 U	0.5 U	**0.28 J**	0.5 U
cis-1,2-Dichloroethene	70	7.3	**70**	**42**	**42**	2.8	2.3	0.5 U	0.5 U	0.38 J	2.4	0.31 J	0.3 J
Cyclohexane	--	1,300	0.31 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Ethylbenzene	600	1.5	0.13 J	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Isopropylbenzene	70	68	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Toluene	600	230	0.28 J	0.2 J	0.19 J	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
trans-1,2-Dichloroethene	100	11	**19**	9.9	10	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.35 J	0.5 U	0.5 U
Trichloroethene	3	0.23	**100**	**58**	**58**	**0.28 J**	0.23 J	0.5 U	0.5 U	0.5 U	**0.26 J**	0.5 U	0.5 U
Vinyl chloride	0.03	0.016	**2**	**1.4**	**1.4**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Total Metals (µg/l)													
Iron	300	2,600	NA	2,000	NA	NA	1,800	NA	**14,000**	NA	**4,800**	NA	**2,900**
Wet Chemistry													
Alkalinity (µg/l)	--	--	NA	130,000	NA	NA	150,000	NA	34,000	NA	39,000	NA	94,000
Chloride (µg/l)	--	--	NA	15,000	NA	NA	14,000	NA	22,000	NA	17,000	NA	11,000
Methane (µg/l)	--	--	NA	180	NA	NA	110	NA	140	NA	190	NA	85
Sulfate (µg/l)	--	--	NA	1,000 U	NA	NA	10,000	NA	24,000	NA	40,000	NA	54,000
Total organic carbon (TOC) (µg/l)	--	--	980	990	NA	1,100	1,000	2,600	3,000	2,200	1,400	1,100	1,000
Dechlorinating Bacteria (gc/ml)													
No Detections													
Functional Genes (gc/ml)													
No Detections													

Notes:

Bold box indicates exceedance of NCGWQS or the more conservative MCL

Bold text indicates exceedance of Adjusted Tap Water RSLs

RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents

* - The MCL-Groundwater value is reported in place of the NCGWQS where the MCL value is more conservative.

NA - Not analyzed

J - Analyte present, value may or may not be accurate or precise

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

gc/ml - Gene copies per milliliter

µg/l - Micrograms per liter

MCL – maximum contaminant level

RSL – Regional Screening Level

TABLE 4-3

Groundwater Analytical Results

Site 49 Remedial Investigation/Feasibility Study

MCIEAST-MCB CAMLEJ, North Carolina

Station ID	**NCGWQS (January, 2010) ***	**Adjusted Tap Water RSLs (October, 2011)**	IR49-MW06		IR49-MW07			IR49-MW08	
Sample ID			IR49-GW06-11A	IR49-GW06-11C	IR49-GW07-11A	IR49-GW07D-11A	IR49-GW07-11C	IR49-GW08-11A	IR49-GW08-11C
Sample Date			04/01/11	08/03/11	04/02/11	04/02/11	08/04/11	04/02/11	08/04/11
Chemical Name									
Volatile Organic Compounds (µg/l)									
1,1,2,2-Tetrachloroethane	0.2	0.067	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-Trichloroethane	5	0.042	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Benzene	1	0.41	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloroform	70	0.19	**0.34 J**	0.5 U	0.5 U	0.5 U	0.5 U	**0.39 J**	0.5 U
cis-1,2-Dichloroethene	70	7.3	0.61 J	0.32 J	0.4 J	0.41 J	0.34 J	0.5 U	0.5 U
Cyclohexane	--	1,300	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Ethylbenzene	600	1.5	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Isopropylbenzene	70	68	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Toluene	600	230	0.1 U	0.1 U	0.1 U	0.1 U	0.09 J	0.1 J	0.1 U
trans-1,2-Dichloroethene	100	11	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichloroethene	3	0.23	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Vinyl chloride	0.03	0.016	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Total Metals (µg/l)									
Iron	300	2,600	NA	**3,100**	NA	NA	2,400	NA	400
Wet Chemistry									
Alkalinity (µg/l)	--	--	NA	93,000	NA	NA	230,000	NA	200,000
Chloride (µg/l)	--	--	NA	12,000	NA	NA	13,000	NA	11,000
Methane (µg/l)	--	--	NA	140	NA	NA	40	NA	19
Sulfate (µg/l)	--	--	NA	8,800	NA	NA	5,600	NA	26,000
Total organic carbon (TOC) (µg/l)	--	--	970	990	1,600	NA	1,100	1,800	1,200
Dechlorinating Bacteria (gc/ml)									
No Detections									
Functional Genes (gc/ml)									
No Detections									

Notes:

Bold box indicates exceedance of NCGWQS or the more conservative MCL

Bold text indicates exceedance of Adjusted Tap Water RSLs

RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents

* - The MCL-Groundwater value is reported in place of the NCGWQS where the MCL value is more conservative.

NA - Not analyzed

J - Analyte present, value may or may not be accurate or precise

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

gc/ml - Gene copies per milliliter

µg/l - Micrograms per liter

MCL – maximum contaminant level

RSL – Regional Screening Level

TABLE 4-4

Porewater Analytical Results

Site 49 Remedial Investigation/Feasibility Study

MCIEAST-MCB CAMLEJ, North Carolina

Station ID	**CLEAN NCGWQS (January, 2010)***	**Adjusted Tap Water RSLs**	IR49-SD04/PW01	IR49-SD05/PW02		IR49-SD06/PW03
Sample ID			IR49-PW01-11A	IR49-PW02-11A	IR49-PW02D-11A	IR49-PW03-11A
Sample Date			04/02/11	04/01/11	04/01/11	04/01/11
Chemical Name						
Volatile Organic Compounds (µg/l)						
1,1,2,2-Tetrachloroethane	0.2	0.067	**0.19 J**	0.5 U	0.5 U	0.5 U
2-Butanone	4,000	710	2.6 J	0.82 J	0.84 J	0.5 U
Acetone	6,000	2200	100	6.2 U	7.6 U	5.6 U
Carbon disulfide	700	100	0.39 J	0.5 U	0.5 U	0.21 J
cis-1,2-Dichloroethene	60	7.3	2.5	0.5 U	0.5 U	0.5 U
Methyl acetate	--	3700	0.97 J	0.5 U	0.75 J	0.5 U
trans-1,2-Dichloroethene	60	11	1.9	0.5 U	0.5 U	0.5 U
Trichloroethene	3	2	1.1	0.5 U	0.5 U	0.5 U
Vinyl chloride	0.03	0.016	**0.3 J**	0.5 U	0.5 U	0.5 U
Wet Chemistry						
Total organic carbon (TOC) (µg/l)	--	--	3,100	17,000	NA	5,700

Notes:

Bold box indicates exceedance of NCGWQS or the more conservative MCL

Bold text indicates exceedance of Adjusted Tap Water RSLs

RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents

* - The MCL-Groundwater value is reported in place of the NC2LGW where the MCL value is more conservative.

NA - Not analyzed

J - Analyte present, value may or may not be accurate or precise

U - The material was analyzed for, but not detected

µg/l - Micrograms per liter

MCL – maximum contaminant level

RSL – Regional Screening Level

TABLE 4-5

Surface Water Analytical Results

Site 49 Remedial Investigation/Feasibility Study

MCIEAST-MCB CAMLEJ, North Carolina

Station ID	NCSWQS Human Health & Water Supply	IR49-SD01/SW01	IR49-SD02/SW02		IR49-SD03/SW03
Sample ID		IR49-SW01-11A	IR49-SW02-11A	IR49-SW02D-11A	IR49-SW03-11A
Sample Date		03/29/11	03/29/11	03/29/11	03/29/11
Chemical Name					
Volatile Organic Compounds (µg/l)					
Bromodichloromethane	0.55	1	0.5 U	0.5 U	0.5 U
Chloroform	5.6	1.7	0.5 U	0.5 U	0.5 U
Dibromochloromethane	0.4	4	0.25 U	0.25 U	0.25 U
Wet Chemistry					
Total organic carbon (TOC) (µg/l)	--	4,300	13,000	NA	3,900

Notes:

Bold box indicates exceedance of the more conservative value between Human Health and Water Supply of the NCSWQS

NA - Not analyzed

NCSWQS - North Carolina 2B Surface Water Standards

U - The material was analyzed for, but not detected

µg/l - Micrograms per liter

TABLE 4-6

Sediment Analytical Results

Site 49 Remedial Investigation/Feasibility Study

MCIEAST-MCB CAMLEJ, North Carolina

Station ID	**CLEAN NCSSLs (January, 2010)**	**Adjusted Industrial Soil RSLs**	**Adjusted Residential Soil RSLs**	IR49-SD01/SW01	IR49-SD02/SW02		IR49-SD03/SW03	IR49-SD04/PW01		IR49-SD05/PW02	IR49-SD06/PW03	
Sample ID				IR49-SD01-11A	IR49-SD02-11A	IR49-SD02D-11A	IR49-SD03-11A	IR49-SD04-11A	IR49-SD04-11B	IR49-SD05-11A	IR49-SD06-11A	IR49-SD06-11B
Sample Date				03/29/11	03/29/11	03/29/11	03/29/11	03/30/11	04/18/11	03/30/11	03/30/11	04/18/11
Chemical Name												
Volatile Organic Compounds (µg/kg)												
2-Butanone	16,000	20,000,000	2,800,000	10 J	660 U	220 U	57 J	NA	3.4 J	230 U	NA	110 U
Acetone	24,000	63,000,000	6,100,000	300 J	1,400 U	440 U	270 U	NA	28 J	460 U	NA	210 U
Benzene	2.6	5,400	1,100	1.3	330 U	110 U	42 U	NA	0.46 J	120 U	NA	53 U
Carbon disulfide	3,800	370,000	82,000	1.3	93 J	31 J	82 J	NA	8.1	46 J	NA	27 U
Cyclohexane	--	120,000	120,000	0.93 J	330 U	110 U	42 U	NA	0.52 U	120 U	NA	53 U
Dichlorodifluoromethane (Freon-12)	29,000	40,000	9,400	0.59 U	330 U	110 U	42 U	NA	0.37 J	120 U	NA	53 U
Ethylbenzene	780	27,000	5,400	0.59 U	330 U	110 U	42 U	NA	0.31 J	120 U	NA	53 U
Methyl acetate	--	29,000,000	7,800,000	8.2	1,900 J	520 J	1,300	NA	0.52 U	700 J	NA	140 J
Methylcyclohexane	--	--	--	0.99 J	170 U	55 U	21 U	NA	0.52 U	58 U	NA	27 U
Methylene chloride	1.3	53,000	11,000	7.3 U	170 U	62 U	22 U	NA	0.54 J	69 U	NA	27 U
Tetrachloroethene	2.3	2,600	550	0.59 J	170 U	55 U	21 U	NA	0.52 U	58 U	NA	27 U
Toluene	690	820,000	500,000	3.7	330 U	110 U	42 U	NA	0.6 J	120 U	NA	53 U
Xylene, total	6,000	260,000	63,000	3 J	660 U	220 U	83 U	NA	0.78 U	230 U	NA	110 U
Wet Chemistry												
Total organic carbon (TOC) (mg/kg)	--	--	--	9,700	160,000	NA	14,000	3,900	NA	32,000	21,000	NA

Notes:

Bold box indicates exceedance of NC SSL

Bold text indicates exceedance of Adjusted Industrial Soil RSLs

Underline indicates exceedance of Adjusted Residential Soil RSLs

RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents

* - The MCL-Groundwater value is reported in place of the NCSSL where the MCL based SSL value is more conservative.

NA - Not analyzed

J - Analyte present, value may or may not be accurate or precise

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

mg/kg - Milligrams per kilogram

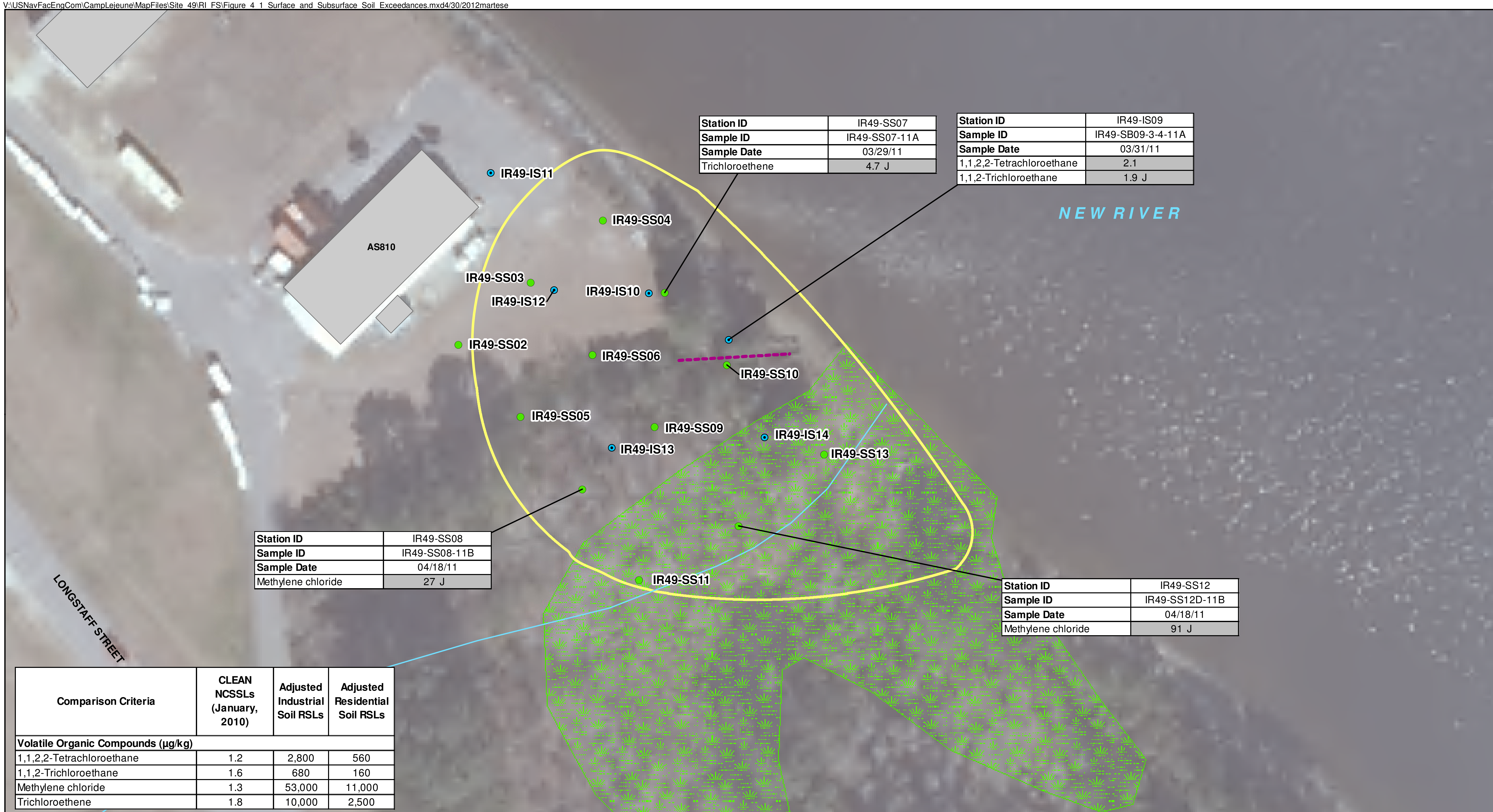
µg/kg - Micrograms per kilogram

MCL – maximum contaminant level

mg/kg – milligrams per kilogram

NC SSL – North Carolina Soil Screening Level

RSL – Regional Screening Level



Station ID	IR49-SS07
Sample ID	IR49-SS07-11A
Sample Date	03/29/11
Trichloroethene	4.7 J

Station ID	IR49-IS09
Sample ID	IR49-SB09-3-4-11A
Sample Date	03/31/11
1,1,2,2-Tetrachloroethane	2.1
1,1,2-Trichloroethane	1.9 J

Station ID	IR49-SS08
Sample ID	IR49-SS08-11B
Sample Date	04/18/11
Methylene chloride	27 J

Station ID	IR49-SS12
Sample ID	IR49-SS12D-11B
Sample Date	04/18/11
Methylene chloride	91 J

Comparison Criteria	CLEAN NCSSLs (January, 2010)	Adjusted Industrial Soil RSLs	Adjusted Residential Soil RSLs
Volatile Organic Compounds (µg/kg)			
1,1,2,2-Tetrachloroethane	1.2	2,800	560
1,1,2-Trichloroethane	1.6	680	160
Methylene chloride	1.3	53,000	11,000
Trichloroethene	1.8	10,000	2,500

Legend

- Surface Soil Locations
- Subsurface Soil Sample Locations
- Drainage Feature
- Buildings
- Site Boundary
- Jurisdictional Wetlands

Notes:
Shading indicates exceedance of NC SSL
Adjusted Industrial and Residential RSLs were not exceeded
J - Analyte present, value may or may not be accurate or precise
µg/kg - micrograms per kilogram

N

0 25 50 100 Feet

1 inch = 50 feet

Figure 4-1
Surface and Subsurface Soil Exceedances
Site 49 Remedial Investigation/Feasibility Study
MCIEAST-MCB CAMLEJ
North Carolina

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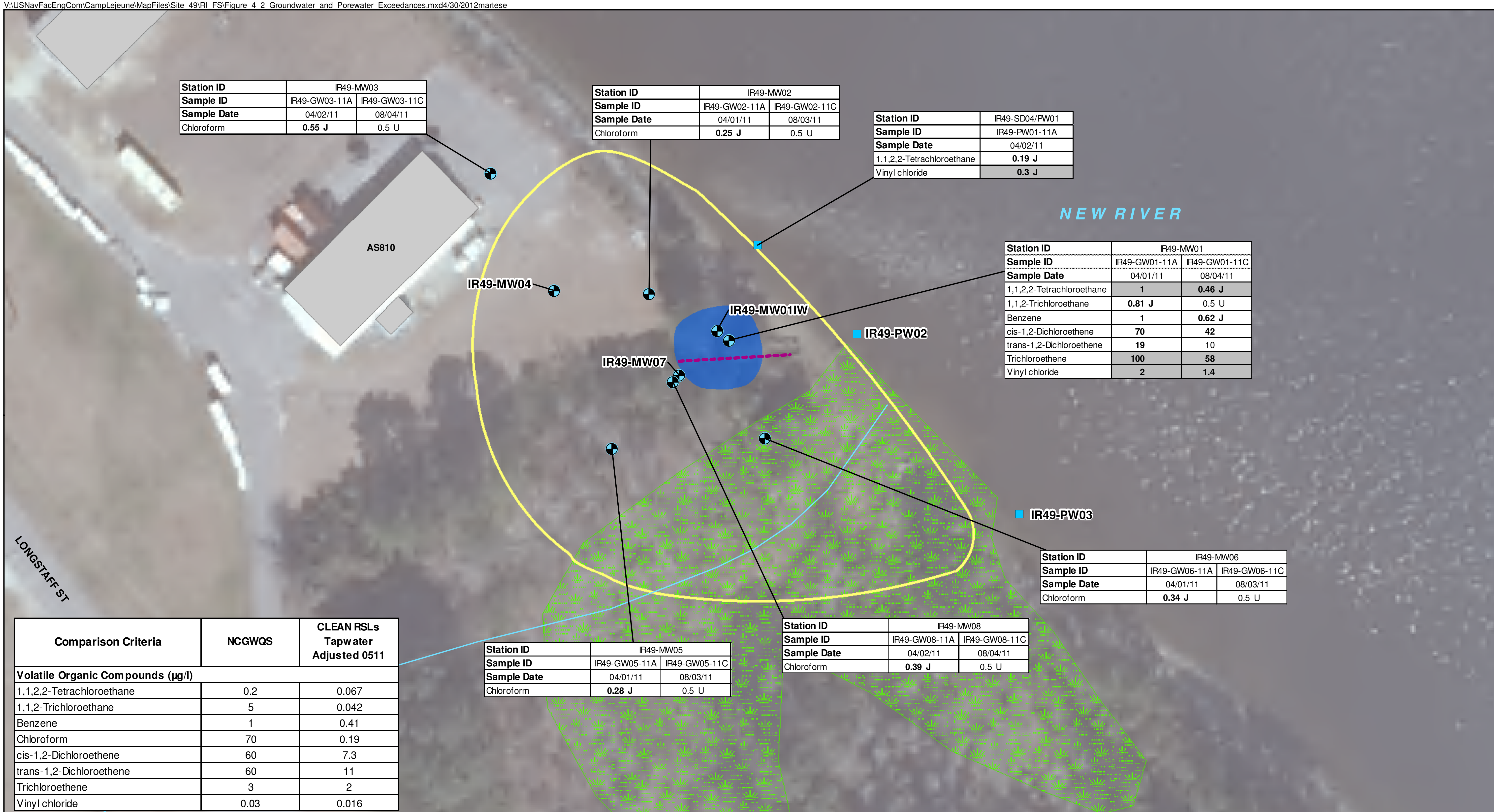

Station ID	IR49-MW03	
Sample ID	IR49-GW03-11A	IR49-GW03-11C
Sample Date	04/02/11	08/04/11
Chloroform	**0.55 J**	0.5 U

Station ID	IR49-MW02	
Sample ID	IR49-GW02-11A	IR49-GW02-11C
Sample Date	04/01/11	08/03/11
Chloroform	**0.25 J**	0.5 U

Station ID	IR49-SD04/PW01
Sample ID	IR49-PW01-11A
Sample Date	04/02/11
1,1,2,2-Tetrachloroethane	**0.19 J**
Vinyl chloride	**0.3 J**

Station ID	IR49-MW01	
Sample ID	IR49-GW01-11A	IR49-GW01-11C
Sample Date	04/01/11	08/04/11
1,1,2,2-Tetrachloroethane	**1**	**0.46 J**
1,1,2-Trichloroethane	**0.81 J**	0.5 U
Benzene	**1**	**0.62 J**
cis-1,2-Dichloroethene	**70**	**42**
trans-1,2-Dichloroethene	**19**	10
Trichloroethene	**100**	**58**
Vinyl chloride	**2**	**1.4**

Station ID	IR49-MW06	
Sample ID	IR49-GW06-11A	IR49-GW06-11C
Sample Date	04/01/11	08/03/11
Chloroform	**0.34 J**	0.5 U

Station ID	IR49-MW08	
Sample ID	IR49-GW08-11A	IR49-GW08-11C
Sample Date	04/02/11	08/04/11
Chloroform	**0.39 J**	0.5 U

Station ID	IR49-MW05	
Sample ID	IR49-GW05-11A	IR49-GW05-11C
Sample Date	04/01/11	08/03/11
Chloroform	**0.28 J**	0.5 U

Comparison Criteria	NCGWQS	CLEAN RSLs Tapwater Adjusted 0511
Volatile Organic Compounds (µg/l)		
1,1,2,2-Tetrachloroethane	0.2	0.067
1,1,2-Trichloroethane	5	0.042
Benzene	1	0.41
Chloroform	70	0.19
cis-1,2-Dichloroethene	60	7.3
trans-1,2-Dichloroethene	60	11
Trichloroethene	3	2
Vinyl chloride	0.03	0.016

Legend
- Pore Water Sample Location
- Monitoring Well Locations
- Approximate Location of Terra Cotta Pipe
- Drainage Feature
- Extent of VOCs Exceeding NCGWQS
- Buildings
- Jurisdictional Wetlands
- Site Boundary

Notes:
Shading indicates exceedance of NCGWQS or the more conservative MCL
Bold text indicates exceedance of Adjusted Tap Water RSLs
J - Analyte present, value may or may not be accurate or precise
µg/l - Micrograms per liter
U - Material was analyzed for, but not detected
-Contours have been interpolated between well locations. Actual conditions may differ from those shown on this figure
-Only exceedances of one or more comparison criteria are shown
- NCGWQS - North Carolina Groundwater Quality Standard

N

0 25 50 100 Feet

1 inch = 50 feet

Figure 4-2
Groundwater and Porewater Exceedances
Site 49 Remedial Investigation/Feasibility Study
MCIEAST-MCB CAMLEJ
North Carolina

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Station ID	IR49-SD01/SW01
Sample ID	IR49-SW01-11A
Sample Date	03/29/11
Bromodichloromethane	1
Dibromochloromethane	4

Comparison Criteria	NCSWQS
Volatile Organic Compounds (µg/l)	
Bromodichloromethane	0.55
Dibromochloromethane	0.4

Legend
- Sediment Sample Locations
- Surface Water Sample Locations
- Approximate Location of Terra Cotta Pipe
- Drainage Feature
- Buildings
- Site Boundary
- Jurisdictional Wetlands

Notes:
Shading indicates exceedance of the more conservative value between Human Health and Water Supply of the NCSWQS
NA - Not analyzed
NCSWQS - North Carolina 2B Surface Water Standards
µg/l - Micrograms per liter
'-Sediment sample results did not exceed applicable standards

N

0 25 50 100 Feet

1 inch = 50 feet

Figure 4-3
Surface Water Exceedances
Site 49 Remedial Investigation/Feasibility Study
MCIEAST-MCB CAMLEJ
North Carolina

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SECTION 5

Contaminant Fate and Transport

The fate and transport of contaminants in environmental media at Site 49, including contaminant mobility and persistence, physical and chemical properties of the contaminants, and physical characteristics of the aquifer are discussed in this section.

5.1 Contaminant Mobility and Persistence

The probable behavior of contaminants is determined by their physical, chemical, and biological interaction with the environment. Mobility and persistence are two key factors in determining probable behavior. Mobility is the potential for a chemical to migrate from a source, and persistence is the measure of how long a chemical will remain in the environment. When considering mobility and persistence, it is also important to understand the type of natural attenuation occurring at the site.

Natural attenuation is defined as “the biodegradation, dispersion, dilution, sorption, volatilization, and/or chemical and biological stabilization of contaminants to effectively reduce contaminant toxicity, mobility, or volume to levels that are protective of human health” (USEPA, 1998).

5.1.1 Contaminant Group

VOCs have been detected in the soil, groundwater, and porewater at Site 49; however, the most prevalent site-related contaminants are VOCs in groundwater present within the surficial aquifer between the drain pipe and New River. The primary VOCs that contribute to the risks to human receptors identified in Section 6 are PCE, TCE, *cis-1,2*-DCE, *trans-1,2*-DCE, VC, 1,1,2,2-PCA, 1,1,2-TCA, benzene, and 1,2 DCE.

5.1.2 Physical and Chemical Properties of Representative Compounds

The physical and chemical properties of the primary VOCs are important when evaluating contaminant transport at Site 49. These properties include:

- Sorption
- Volatilization
- Degradation
- Bioaccumulation
- Non-aqueous Phase Liquids (NAPLs)

The following profiles describe how chemical and physical properties (such as water solubility and specific gravity) of the contaminants affect their mobility and persistence. **Table 5-1** summarizes the relevant physical and chemical properties of the contaminants. **Table 5-2** summarizes the water quality parameters (pH, specific conductance, temperature, DO, ORP, and turbidity) recorded during the 2011 sampling events.

Sorption

Sorption is the tendency for chemicals to adsorb to and desorb from the media through which they are being transported. The subsurface materials to which site-related contaminants are most likely to adsorb are typically clays and organic material. As noted in Section 2, the geological formations present at Site 49 consist predominantly of clays and silty sands. Thus, there is a possibility that treatment may preferentially target the contaminants in the sands and leave the contaminants sorbed to the clay, potentially causing a tailing effect of contaminants back diffusing into the sand from the clay.

The conventional measure of sorption of a given chemical to soil and geologic material is the distribution coefficient (K_d), also known as soil-water partition coefficient (K_{oc}). The K_d for organic chemicals is the product of a K_{oc} of the chemical and the fraction of organic carbon (f_{oc}) in the soil. In general, chemicals with a K_d greater than 10,000 milliliters per gram (ml/g) or a log K_{oc} greater than 5 ml/g have high degrees of adsorption and low mobility.

Chemicals with a K_d less than 1,000 ml/g or a log K_{oc} less than 3 ml/g have lower degrees of adsorption and higher mobility potential. This is characteristic of the VOCs detected in the groundwater at Site 49. For example, TCE and VC both have relatively low log K_{oc} values (2.10 ml/g and 0.91 ml/g, respectively [USEPA, 1990]) and thus a lower tendency for adsorption to the subsurface material, which enhances their mobility through the environment. All VOCs detected at Site 49 have log K_{oc} values of less than 3 ml/g and are considered to have moderate to high mobility in soil, suggesting that they are likely to leach from soil to groundwater.

The migration rates of different dissolved contaminants vary depending on their tendency to adsorb to the site-specific aquifer matrix. Consequently, the rate of contaminant migration is generally lower than the groundwater seepage velocity, referred to as "retardation." For each contaminant detected at Site 49, it is possible to calculate theoretical retardation coefficients, which are estimates of how the migration of a contaminant is slowed by adsorption with respect to groundwater average linear velocity. Soil retardation coefficients for VOCs detected in the groundwater at Site 49 are presented in **Table 5-3**. The following is a brief explanation of the retardation coefficient equation:

$$R = 1 + p_b \times K_d / n_e$$

where:

- R = Retardation coefficient (dimensionless)
- p_b = Bulk density (grams per cubic centimeter)
- K_d = Distribution coefficient (ml/g)
- n_e = Effective porosity (dimensionless)

The effect of retardation is estimated by dividing the groundwater flow velocity by R, which provides a value of migration that is either equal to the flow rate (in the case of no retardation) or less than the flow rate (in the presence of retardation).

Estimates of the rates of contaminant migration are approximate, and the estimates of R have an even greater level of uncertainty than do the estimates of the rates of groundwater flow. Contaminant migration velocities can be approximated by modifying the Darcy Equation to utilize the available groundwater velocity data described in Section 4.3.2 and the chemical-specific properties presented in **Table 5-1.** The Darcy Equation can be used to calculate a groundwater velocity within a porous medium, as shown in the following equation:

$$V_L = (K \times i)/n_e$$

where:

- V_L = Linear groundwater seepage velocity (L/T)
- K = Hydraulic conductivity (L/T)
- i = Hydraulic gradient (dimensionless)
- n_e = Effective porosity (dimensionless)

Contaminant migration velocity is the quotient of the linear groundwater velocity and the retardation factor, shown as follows:

$$V_{COC} = V_L/R$$

where:

- V_{coc} = Velocity of the constituent of concern (COC) (L/T)
- V_L = Linear groundwater velocity (L/T)
- R = Retardation coefficient (dimensionless)

Approximate migration velocities for the COCs are listed in **Table 5-3**. Of the contaminants listed in the table, PCE will likely travel at the slowest rate due to the relatively high retardation coefficient and the chemical's affinity to sorb onto, or partition into, organic matter that may be coating the aquifer matrix. Because VC has a retardation coefficient of 1.06, it will likely migrate through the aquifer at approximately the same velocity as groundwater.

Volatilization

Volatilization is the tendency for some chemicals, particularly VOCs, to change from a liquid or adsorbed state to a gas. A conventional measure of volatility is Henry's Law Constant (K_h). Values of K_h for the COCs are presented in **Table 5-1**. In general, compounds with K_h values greater than 10^{-3} atmosphere-cubic meters per mole (atm-m^3/M) are expected to volatilize readily from water to air. Compounds with K_h values less than 10^{-5} atm-m^3/M are generally stable and not expected to volatilize from water to air. All the primary COCs are quite volatile, except 1,1,2,2-PCA, which has a K_h of 3.45×10^{-4} atm-m^3/M, representing its less volatile nature.

The dominant process for removing VOCs from shallow soil is volatilization into the atmosphere, characterized by their relatively high K_h values and vapor pressures. Thus, VOCs occur infrequently in shallow soil, and likely volatilize into soil gas overlying the water table. The vapor pressure and K_h of VC suggest it will volatilize at the highest rate.

Degradation

Degradation is the transformation of one chemical to another through either biotic (biodegradation) or abiotic processes (such as the degradation mediated by iron-bearing minerals in an aquifer). Both metabolic and/or co-metabolic processes (differentiated by whether degradation of the contaminants is linked to the growth of the functional microbes) could be involved with biodegradation. Degradation rates for whatever processes may be operating to break down the chemical are commonly described using (first order) rate constant or half-life. Estimates of half-lives for the COCs of this site are presented in **Table 5-1**.

VOCs can undergo biodegradation through various pathways, such as reductive dechlorination and dihaloelimination (for chloroethanes, involving the removal of two halogen atoms that are on adjacent carbons, leading to the formation of a double carbon-carbon bond) under reducing oxidation-reduction (redox) conditions, and aerobic oxidation. The primary biodegradation process for TCE and *cis*-DCE is reductive dechlorination (USEPA, 1998). During this process, VOCs are used as electron acceptors based on the availability of an adequate supply of electron donors. Anthropogenic and natural organic carbon sources act as electron donors. During the biodegradation process, chlorine atoms are removed from the VOCs and replaced by hydrogen atoms. Complete reductive dechlorination is possible, depending on the site-specific biogeochemical conditions.

The rate of reductive dechlorination appears to decrease as the degree of chlorination decreases. Therefore, TCE degradation rates are generally higher than those of *cis*-DCE and VC. The less chlorinated degradation byproducts may undergo oxidation under aerobic conditions.

Concentrations of parent compounds, daughter products, and NAIPs are used to evaluate the extent to which biodegradation occurs. Concentrations of daughter products and chloride ions that are greater than background levels, or that increase downgradient through the plume, indicate some degree of occurrence of reductive dechlorination. Deep reducing conditions between sulfate-reducing and methanogenic conditions are most favorable for anaerobic biodegradation of chlorinated solvents. Elevated concentrations of TOC indicate sufficient substrate to support biodegradation. Production of ethene indicates complete dechlorination of chloroethenes.

Fate of Degradation of the Site-specific COCs

The primary parent contaminant at this site may be 1,1,2,2-PCA, with TCE as a possible co-contaminant. TCE and all the other COCs, except benzene, can theoretically be degradation products of 1,1,2,2-PCA. Degradation of 1,1,2,2-PCA may undergo three pathways: (1) abiotic dehydrochlorination to TCE; (2) reductive dechlorination to 1,1,2-TCA; and (3) dichloroelimination to *cis*-DCE and *trans*-DCE. Further reductive dechlorination of DCE and dichloroelimination of 1,1,2-TCA may occur to produce VC. The low ratio of *cis*-DCE to *trans*-DCE (approximately 4:1) indicates that the detected concentrations of DCE are mainly from dichloroelimination of 1,1,2,2-PCA rather than reductive dechlorination of TCE, which should result in a much higher ratio of *cis*-DCE to *trans*-DCE (such as 14:1) (Lorah and Olsen, 1999). As presently discussed, biogeochemical conditions were generally not favorable for biotic reductive dechlorination of chloroethenes (TCE $\rightarrow$ *cis*-DCE $\rightarrow$ VC $\rightarrow$ ethene). Therefore, the VC detected at this site is predicted to be from dichloroelimination of 1,1,2-TCA. While evidence of past degradation by abiotic mechanisms is present, current conditions do not support abiotic processes.

Natural Attenuation Indicator Parameters

During the August 2011 groundwater monitoring event, samples were collected and submitted for laboratory analysis of alkalinity, chloride, sulfate, sulfide, TOC, methane, ethane, ethene, and microbial analysis for DHC and DHC functional genes. Groundwater quality parameters (DO, pH, ORP, and temperature) and NAIPs measured in the field (nitrate, nitrite, and ferrous iron [Fe (II)]) were collected during the April and August 2011 groundwater sampling events. Additionally, the sample collected from IR49-MW01 (where the highest concentration of chlorinated volatile organic compounds [CVOCs] was detected) was analyzed for CSIA to evaluate the carbon isotopic ratios in TCE and *cis*-DCE detected in groundwater. A summary of the NAIPs is provided in **Table 5-2**, and an explanation of the results is presented as follows.

Alkalinity and pH

Based on the analytical data, alkalinity in the surficial aquifer at Site 49 ranges from 34 milligrams per liter (mg/L) (IR49-MW03) to 230 mg/L (IR49-MW07), indicating a relatively poor buffering capacity. There is a potential link between the neutral to slightly acidic pH measured in the surficial aquifer and the relatively low alkalinity. The pH measurements collected from the surficial aquifer during the April and August 2011 sampling events fall on the acidic end of the acceptable range for reductive dechlorination (geometric mean of 5.90 and 5.91, respectively). This is potentially a limiting factor to natural biodegradation.

Dissolved Oxygen and Oxidation-Reduction Potential

Generally, DO concentrations below 0.5 mg/L indicate prevailing anaerobic conditions necessary to facilitate reductive dechlorination.

DO concentrations in the surficial aquifer ranged from 0.42 mg/L (IR49-MW07) to 2.38 mg/L (IR49-M03), with a geometric mean of 0.84 mg/L during the April 2011 event, and from 0.12 mg/L (IR49-MW06) to 0.60 mg/L (IR49-MW03), with a geometric mean of 0.26 mg/L during the August 2011 event. Based on the DO concentration data, it appears that anaerobic conditions are present.

The ORP of groundwater is a measure of electron activity and is an indicator of the relative tendency of a solution to accept or transfer electrons. Reductive dechlorination is most efficient in the ORP range corresponding to sulfate reduction and methanogenesis (less than -100 mV).

During the April 2011 sampling event, ORP measurements collected surficial aquifer ranged from 125.4 mV (IR49-MW04) to -117.2 mV (IR49-MW06). During the August 2011 sampling event, ORP measurements ranged from 95.8 mV (IR49-MW04) to -126.8 mV (IR49-MW05). The DO and ORP data indicate generally favorable anaerobic conditions exist in the surficial aquifer.

Nitrate and Nitrite

When DO is been depleted, nitrate can be used as an electron acceptor in anaerobic degradation via denitrification. In denitrification, nitrate is reduced to produce nitrite. Therefore, decreased nitrate concentrations and increased nitrite concentrations relative to background levels indicate that nitrate reduction is occurring. However, at concentrations greater than 1 mg/L, nitrate can compete with chlorinated hydrocarbons as an electron acceptor.

Nitrate and nitrite were not detected in any of the surficial aquifer monitoring wells, suggesting that nitrate is not an available electron acceptor at this site.

Ferrous Iron

In some cases, ferric iron (Fe [III]) is used as an electron acceptor during anaerobic degradation. During this process (termed “iron reduction”), Fe (III) is reduced to Fe (II). Dissolved Fe (II) concentrations greater than 1 mg/L are considered an indicator of iron-reducing conditions.

Concentrations of Fe (II) ranged from 1.2 mg/L (IR49-MW01) to 2.6 mg/L (IR49-MW05), indicating that iron-reducing conditions are present.

Chloride

Like the geochemical indicators previously discussed, chloride concentrations greater than background levels indicate that reduction of chlorinated-solvent-related contamination is occurring (USEPA, 1998; Wiedemeier et al., 1996). However, chloride is not a suitable NAIP for a diffused low concentration chloroethene plume because chloride released from dechlorination may not impact the chloride background concentration significantly.

Concentrations of chloride ranged from non-detect (IR49-MW05) to 22 mg/L (IR49-MW03). Concentrations of chloride detected in the source area monitoring well IR49-MW01 (15 mg/L) were not elevated and support the conclusion that natural biodegradation is not occurring.

Sulfate and Sulfide

Sulfate may be used as the electron acceptor in anaerobic degradation. This process, known as sulfate reduction, will produce concentrations of sulfide. Over time, a decreasing trend of sulfate concentrations may indicate occurrence of biological sulfate reduction. Concentrations of sulfide in the groundwater would support this conclusion.

Concentrations of sulfate ranged from non-detect (IR49-MW01) to 54 mg/L (IR49-MW05). The lack of sulfate in groundwater collected from IR49-MW01 suggests historical presence of sulfate-reducing conditions; however, concentrations of sulfide were not detected indicating biological sulfate reduction is not occurring.

Total Organic Carbon

Organic carbon is utilized as an electron donor in reductive dechlorination and is required to drive the process. Organic carbon can be naturally occurring or anthropogenic. The presence of TOC at concentrations greater than 20 mg/L indicates ideal conditions for reductive dechlorination to occur (USEPA, 1998; Wiedemeier et al., 1996).

Concentrations of TOC ranged from 0.96 mg/L (IR49-MW01) to 1.4 mg/L (IR49-MW03). These concentrations indicate a substrate-limiting environment for reductive dechlorination.

Methane, Ethane, and Ethene

After the other, previously noted, electron acceptors have been utilized, carbon dioxide can be used as the electron acceptor in methanogenesis. In this process, carbon dioxide is reduced to produce methane. The presence of methane (greater than 0.1 mg/L) in the aquifer is indicative of deep reducing conditions and suggests that methanogenesis is occurring. Reductive dechlorination is most efficient between sulfate-reducing and methanogenic conditions.

Concentrations of methane ranged from 0.085 mg/L (IR49-MW05) to 0.19 mg/L (IR49-MW04). Additionally, concentrations of ethene and ethane were not detected in groundwater samples collected from the site. The trace concentrations of methane indicate methanogenic conditions are possible. However, the absence of ethene and ethane (the end products of complete reductive dechlorination) suggest that reductive dechlorination is incomplete.

Compound-specific Isotope Analysis

The carbon 13 isotope ratios ($\delta^{13}C$) of TCE and *cis*-DCE at IR49-MW01 were within the intrinsic $\delta^{13}C$ ranges of these two compounds in literature; that is, from -23 to -34 parts per thousand ($^{0}/_{00}$) for TCE and -22 to -30 $^{0}/_{00}$ for *cis*-DCE (USEPA, 2008). These CSIA data do not provide solid evidence of occurrence of destructive dechlorination processes of TCE and *cis*-DCE at Site 49 (**Appendix E**).

Microbial Data

DHC and functional genes including *tceA, bvcA,* and *vcrA* were not detected above laboratory reporting limits in samples collected from IR49-MW07 and IR49-MW01 (**Appendix E**). Absence of these specific microorganisms and functional genes may indicate unfavorable biological conditions for complete biotic reductive dechlorination.

5.1.3 Physical Properties of the Aquifer

The following physical mechanisms are key factors in controlling the fate and transport of contaminants dissolved in groundwater during migration:

- Advection
- Dispersion

Advection is the transport of dissolved contaminants by the bulk motion of flowing groundwater. Advection controls the rate and direction of contaminant migration. The site-specific horizontal average linear seepage velocities for groundwater flow in the surficial aquifer ranged from 4.54 feet per year (ft/yr) to 22.3 ft/yr.

Dispersion is the distribution of dissolved contaminants along the path where they flow during advection. It is a result of the spatial variation in aquifer permeability, fluid mixing, and molecular diffusion. Dispersion primarily controls the concentrations of the contaminants at any point in the flow system.

Dispersion occurs in moving groundwater because of local variations in flow velocities caused by the variability of the hydraulic conductivity of porous media. Typically, the degree of dispersion is greater in the direction of groundwater flow than in directions perpendicular to it. The concentrations in the center of the contaminant plume decrease as dispersion dilutes the contaminant mass. Migration of contaminants from the center of the mass varies based on the retardation coefficient, as previously described.

5.2 Contaminant Migration and Attenuation

This section discusses the source areas and the potential mechanisms for contaminant release and migration.

Fundamental to describing fate and transport at the site is the conceptual site model (CSM), graphically represented on **Figure 5-1**. The CSM describes the topography and hydrogeology of the site, extent of the contamination plume, and the complete migration pathways.

5.2.1 Releases from Soil to the Atmosphere

In general, concentrations of VOCs in surface and subsurface soil were low (less than 5 µg/kg). Based on the low concentration of VOCs, volatilization, which is the primary mechanism of releases from the soil to the atmosphere, is not likely to be a significant contaminant release mechanism at Site 49.

5.2.2 Releases from Soil to Groundwater

A portion of the precipitation that falls within the boundary of Site 49 is expected to infiltrate the ground surface and reach the water table at 1.97 ft above msl to 2.88 ft above msl. Infiltration of precipitation through the unsaturated vadose zone can potentially dissolve contaminants and then transport them to the underlying groundwater. Thus, surface soil and subsurface soil with concentrations of the VOCs above screening levels can serve as sources of contaminants detected in groundwater. However, based in the concentrations of VOCs detected in surface and subsurface soil at Site 49, it is likely that VOCs detected in soil will stay sorbed to organic material in the vadose zone.

5.2.3 Migration of Contaminants in Groundwater

The New River is located downgradient of the eastern boundary of Site 49 and is the ultimate receptor for groundwater discharge from the site. Dissolved concentrations of the VOCs can be transported by groundwater movement at a rate governed by advection and chemical-specific retardation factors. Horizontal migration to the river represents the major migration pathway based on the absence of a non-aqueous phase for of all the VOCs detected, the generally low concentrations of VOCs (100 µg/L or less), and presence of upward hydraulic gradients.

5.2.4 Attenuation of Contaminants in Groundwater

Based on the absence of desirable microorganisms, generally low TOC levels (less than 20 mg/L), and slightly acidic pH, conditions favorable to biological natural attenuation are generally not present. Based on the lack of biological degradation occurring at the site, it appears that dilution and adsorption are likely the primary mechanisms that control the fate and transport of the VOCs at this site.

5.3 Summary

Surface soil, subsurface soil, and porewater contaminants are isolated and were found in relatively low concentrations. Based on the physical and chemical properties of these contaminants, they are not expected to migrate and will likely degrade *in situ*.

Although concentrations of VOCs were detected in groundwater within the surficial aquifer, vertical migration of these contaminants is not occurring based on the low concentrations and upward vertical gradients. Thus, horizontal groundwater migration is the primary contaminant transportation pathway. Based on the lack of evidence for biodegradation, the primary contaminant degradation mechanisms are dilution and adsorption.

TABLE 5-1

Physical and Chemical Properties of Contaminants

Site 49 Remedial Investigation/Feasibility Study

MCIEAST-MCB CAMLEJ, North Carolina

Chemical	Molecular Weight (g/mole)	Specific Gravity [2] (unitless)	Solubility [2] (mg/L)	Vapor Pressure at 20ºC [2] (mmHg)	K_h [5] (atm-m^3/mole)	Log K_{oc} [2] (mL/g)	K_{ow} [2] (mL/g)	Half-Life Range (days) Soil Low	Soil High	Groundwater Low	Groundwater High	Surface Water Low	Surface Water High
VOCs													
Trichloroethene	131.38 [4]	1.462	1,385	58.7	0.0103	2.1	2.42	180 [1]	365 [1]	320 [1]	1,640 [1]	180 [1]	365 [1]
Tetrachloroethene	165.82 [4]	1.625	150	14	0.0184	2.82	3.14	180 [1]	360 [1]	360 [1]	720 [1]	180 [1]	360 [1]
cis-1,2-Dichloroethene	96.94 [4]	1.284	3,500	200	0.00408	1.5	1.86	28 [1]	180 [1]	56 [1]	2,875 [1]	28 [1]	180 [1]
Vinyl Chloride	62.5 [4]	0.912	1,100	2,300	0.027	0.91	0.60	Rapid [3]		18 [3]		0.0194 [3]	
Benzene	78.12 [4]	0.877	1,780	76	0.00555	1.81	2.13	100 [3]		1.4 [3]		0.026 [3]	
trans 1,2-Dichloroethene	96.94 [4]	1.257	6,300	265	0.0066	1.77	2.09						
1,1,2,2-Tetrachloroethane	167.9 [2]	1.6	2,900	4.9	0.000345	2.34	2.39						
1,1,2-Trichloroethane	133.4 [4]	1.4436	4,500	18.8	0.000913	1.75	2.17						
1,2-Dichloroethane	98.96 [4]	1.253	8,700	63.7	0.000979	1.15	1.48						

Notes:

g/mole – grams per mole

mg/L – milligrams per liter

mmHg – millimeters of mercury

atm-m3/M – atmosphere-cubic meters per mole

ml/g – milliliters per gram

VOC – volatile organic compound

K_h - Henry's Law Constant

K_{oc} - Organic carbon partition coefficient

K_{ow} - Octanol-water partition coefficient

Data sources:

(1) Howard, Ph. H. et al. 1991. *Handbook of Environmental Degradation Rates.*

(2) United States Environmental Protection Agency. October 1990. *Subsurface Contamination Reference Guide.*

(3) Montgomery, John H. Groundwater Chemicals Desk Reference. Third Edition.

(4) Watt, Richard. 1998. *Hazardous Wastes: Sources Pathways Receptors.*

(5) United States Environmental Protection Agency. July 1996. *Soil Screening Guidance*

TABLE 5-2

Summary of Natural Attenuation Indicator Parameters

Site 49 Remedial Investigation/Feasibility Study

MCIEAST-MCB CAMLEJ, North Carolina

Well Identification	Temperature		DO		pH		ORP		Ferrous Iron (mg/L)	Total Iron (mg/L)	Nitrate (mg/L)	Nitrite (mg/L)	Alkalinity (mg/L)	Chloride (mg/L)	Sulfate (mg/L)	Sulfide (mg/L)
	4/1/2011	8/3/2011	4/1/2011	8/3/2011	4/1/2011	8/3/2011	4/1/2011	8/3/2011								
IR49-MW01	15.50	23.00	0.71	0.46	6.29	6.23	-34.1	-70.1	1.2	2	0	0	130	15	<1.0	<1.0
IR49-MW02	16.55	21.81	0.54	0.18	5.96	5.91	-103.1	-69.4	1.8	1.8	0	0	150	14	10	<1.0
IR49-MW03	16.87	23.03	2.38	0.60	5.24	5.43	119	94.8	1.4	14	0	0	34	22	24	<1.0
IR49-MW04	15.26	24.51	2.02	0.31	5.03	5.56	125.4	-91.4	1.3	4.8	0	0	39	17	40	<1.0
IR49-MW05	15.72	26.02	0.55	0.20	6.09	6.09	-108.2	-126.8	2.6	2.9	0	0	94	11	54	<1.0
IR49-MW06	15.98	23.31	0.66	0.12	6.01	5.73	-117.2	-86.6	2.4	3.1	0	0	93	12	8.8	<1.0
IR49-MW07	16.48	19.41	0.42	0.16	6.85	6.47	-45	-84.7	2.2	2.4	0	0	230	13	5.6	<1.0
IR49-MW08	17.72	20.02	0.87	0.36	7.81	7.57	-169.2	-117.5	0.2	0.4	0	0	200	11	26	<1.0

Notes:

µg/L - Micrograms per liter
mg/L - Mlligrams per liter
mV - Millivolts
DO - Dissolved oxygen
ORP - Oxidation reduction potential
TOC - Total organic carbon

TABLE 5-2

Summary of Natural Attenuation Indicator Parameters

Site 49 Remedial Investigation/Feasibility Study

MCIEAST-MCB CAMLEJ, North Carolina

Well Identification	Temperature		DO		pH		ORP		Ferrous Iron (mg/L)	TOC (mg/L)	Methane (µg/L)	Ethane (µg/L)	Ethene (µg/L)
	4/1/2011	8/3/2011	4/1/2011	8/3/2011	4/1/2011	8/3/2011	4/1/2011	8/3/2011					
IR49-MW01	15.50	23.00	0.71	0.46	6.29	6.23	-34.1	-70.1	1.2	0.96	180	<0.91	<0.84
IR49-MW02	16.55	21.81	0.54	0.18	5.96	5.91	-103.1	-69.4	1.8	1	110	<0.91	<0.84
IR49-MW03	16.87	23.03	2.38	0.60	5.24	5.43	119	94.8	1.4	3	140	<0.91	<0.84
IR49-MW04	15.26	24.51	2.02	0.31	5.03	5.56	125.4	-91.4	1.3	1.4	190	<0.91	<0.84
IR49-MW05	15.72	26.02	0.55	0.20	6.09	6.09	-108.2	-126.8	2.6	1	85	<0.91	<0.84
IR49-MW06	15.98	23.31	0.66	0.12	6.01	5.73	-117.2	-86.6	2.4	0.99	140	<0.91	<0.84
IR49-MW07	16.48	19.41	0.42	0.16	6.85	6.47	-45	-84.7	2.2	1.1	40	<0.91	<0.84
IR49-MW08	17.72	20.02	0.87	0.36	7.81	7.57	-169.2	-117.5	0.2	1.2	19	<0.91	<0.84

Notes:
µg/L - Micrograms per liter
mg/L - Mlligrams per liter
mV - Millivolts
DO - Dissolved oxygen
ORP - Oxidation reduction potential
TOC - Total organic carbon

TABLE 5-3

Contaminant Transport Characteristics

Site 49 Remedial Investigation/Feasibility Study

MCIEAST-MCB CAMLEJ, North Carolina

Chemicals	Log K_{oc} (mL/g)	K_d (mg/g)	R (dimensionless)	V_{coc} (ft/day)	V_{coc} (ft/1 year)	Predicted Contaminant Migration (ft) after 30 years
Trichloroethene	2.1	0.15	1.92	0.011	4.05	121
Tetrachloroethene	2.82	0.79	5.84	0.004	1.33	40
cis-1,2-Dichloroethene	1.5	0.04	1.23	0.017	6.31	189
trans 1,2-Dichloroethene	1.77	0.07	1.43	0.015	5.43	163
Vinyl Chloride	0.91	0.01	1.06	0.020	7.34	220
1,1,2,2-Tetrachloroethane	2.34	0.26	2.60	0.008	2.99	90
1,1,2-Trichloroethane	1.75	0.07	1.41	0.015	5.51	165
1,2-Dichloroethane	1.15	0.02	1.10	0.019	7.05	211
Benzene	1.8	0.08	1.46	0.015	5.32	160

Notes:

K_{oc} - Organic carbon partition coefficient

ml/g - milliliter per gram

K_d - Distribution coefficient (1)

mg/g - milligrams per gram

R - Retardation coefficient = $1 + K_d \times p_b / n_e$

V_{coc} - Contaminant migration velocity (ft/day) = Vs / R

ft/day - feet per day

n_e - Effective porosity = 0.20

p_b - Soil bulk density = 1.22 grams per cubic centimeter for clayey soils (2)

Vs - seepage velocity = 0.021 ft/day

(1) For organics, Kd = Koc × fraction of organic carbon, estimated to be 0.0012 for soil based on site-specific measurements cited in Woodward-Clyde, et. al., August 1990. *Multimedia Exposure Assessment Model (Multimed) for Evaluating the Land Disposal of Wastes -- Model Theory.*

(2) Dawson, K. J. and J. D. Istok. 1991. Aquifer Testing, Design and Analysis of Pumping and Slug Tests. Lewis Publishers, INC. Chelsea, Michigan

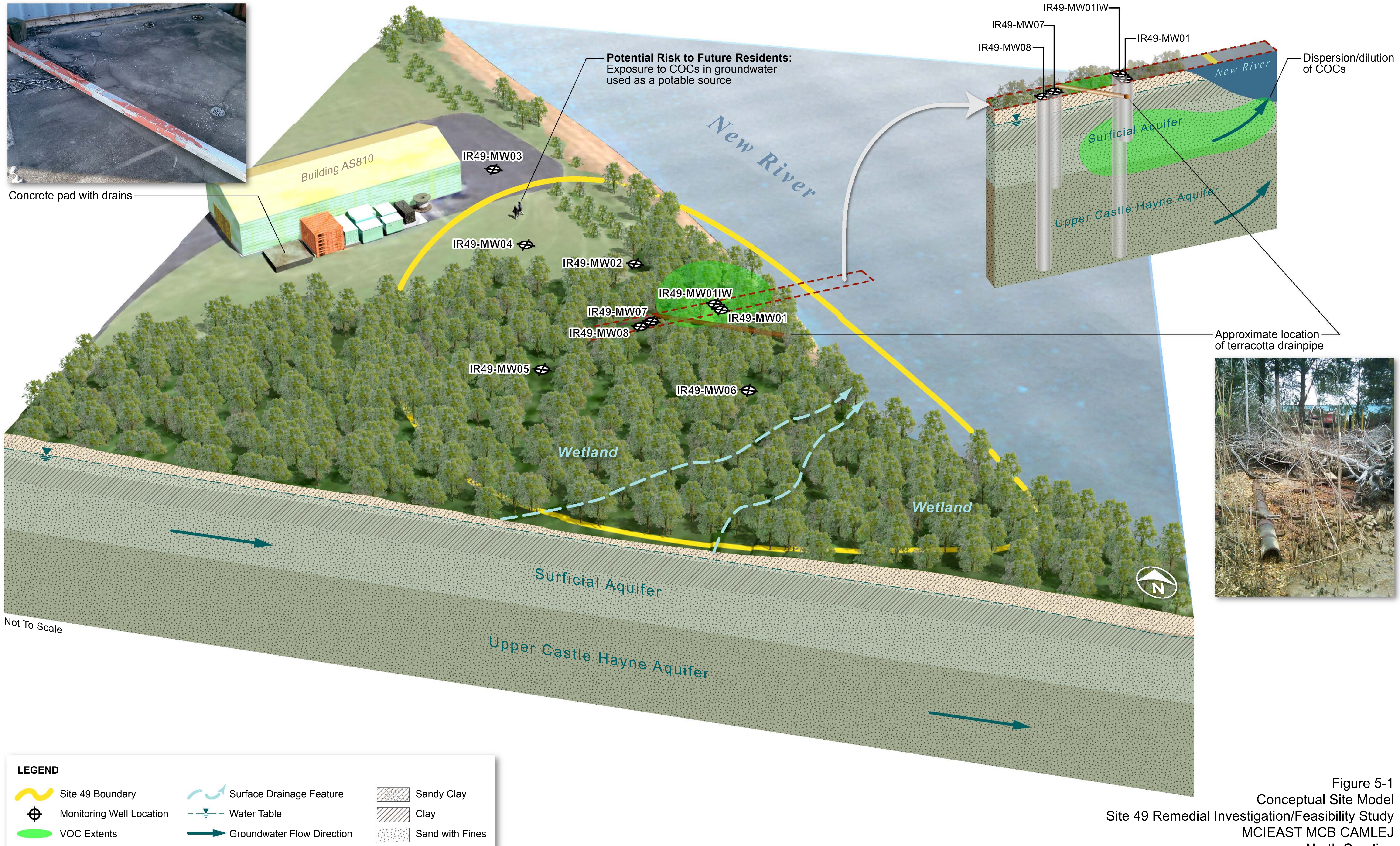

Figure 5-1
Conceptual Site Model
Site 49 Remedial Investigation/Feasibility Study
MCIEAST MCB CAMLEJ
North Carolina

SECTION 6
Human Health Risk Assessment

This section presents the results of a baseline Human Health Risk Assessment (HHRA) for soil, surface water, sediment, and groundwater at Site 49. The data used for this risk assessment are discussed in Section 4. Supplemental information used in the risk assessment is presented in **Appendix F** and includes the *Risk Assessment Guidance for Superfund (RAGS), Volume 1, Human Health Evaluation Manual, Part D* (USEPA, 2001a) tables and additional supporting tables. Guidance documents used for preparing the risk assessment include *RAGS Part A* (USEPA, 1989), *RAGS Part D* (USEPA, 2001a), *RAGS Part E* (USEPA, 2004), *RAGS Part F* (USEPA, 2009a), and USEPA Region 4 *Supplemental Guidance to RAGS: Region 4 Bulletins* (USEPA, 2000a).

6.1 Conceptual Site Model

The human health CSM presents an overview of site conditions, potential contaminant migration pathways, and exposure pathways to potential receptors (**Figure 6-1**).

Table 1 in **Appendix F** summarizes the potential exposure pathways and scenarios considered for Site 49. Potential current receptors include site workers who occasionally access the site for landscaping activities or to access the building near the site, visitors and trespassers, and recreational users. The current site workers and visitors and trespassers may come in contact with surface soil, surface water, and sediment in the drainage ditch. The current recreational users may come in contact with surface water and sediment in the New River while boating or swimming in the river or recreating on the river's shoreline. Exposure routes for surface soil may include incidental ingestion and dermal contact with the surface soil and inhalation of particulate and volatile emissions from the surface soil. Exposure routes for surface water and sediment may include incidental ingestion and dermal contact while wading in the drainage ditches or swimming or boating in the New River.

Potential future receptors include the current receptors, future residents, industrial workers, and construction workers. It is assumed that future receptors could be exposed to surface and subsurface soil if residential houses or additional industrial buildings are constructed at the site, or if excavation activities bring subsurface soil to the surface. However, there are no plans for a future site use different than the current use. Exposure routes for the surface and subsurface soil are the same as those for current surface soil, incidental ingestion of the soil, dermal contact with the soil, and inhalation of particulate and volatile emissions from the soil.

Potable water supplies for MCIEAST-MCB CAMLEJ and the surrounding residential area are provided by water supply wells that pump groundwater from the Castle Hayne aquifer. Although freshwater is present within the surficial, Castle Hayne, Beaufort, and Peedee aquifers, all of which are located below MCIEAST-MCB CAMLEJ, only the Castle Hayne aquifer is used by MCIEAST-MCB CAMLEJ as a water supply source (Cardinell, Berg, and Lloyd, 1993). The groundwater-use patterns are already established for the Base and area around Site 49, thus use of site groundwater for industrial or residential purposes is unlikely. In addition, part of Site 49 is located in jurisdictional wetlands, which further limits future industrial or residential land use. However, state and federal governing policies assume that underground fresh water resources are potable, and should be aimed to be maintained as such. Therefore, a potable-use scenario was evaluated in this risk assessment. It was assumed that residents would be exposed through ingestion and dermal contact and inhalation while bathing. It was also assumed that the groundwater could be used as a future potable water supply for industrial workers, and the industrial workers would be exposed through ingestion. Additionally, due to the groundwater depth (from 2 to 4 ft bgs), construction workers could be exposed to the groundwater through inhalation of volatiles and dermal contact in an excavation during construction activities.

Although the exposure pathways associated with potable use of groundwater are likely incomplete for future human receptor populations at Site 49, there is the potential for vapor intrusion (VI) of volatile constituents in groundwater into future buildings. Future residents and industrial workers could be exposed to the groundwater through VI into a building and inhalation of indoor air. VI was semi-quantitatively evaluated in the risk assessment (the groundwater concentrations were screened against VI screening levels but constituents of potential concern

[COPCs] were not carried forward for further quantitative evaluation) because there are no plans for a future site use different from the current use at Site 49 (no plans for construction of any type of buildings, industrial or residential, onsite). The building currently onsite is used for storage, occupancy is intermittent, and it is located more than 100 ft from the impacted groundwater; therefore, exposures to COPCs in indoor air are considered insignificant.

6.2 Scope of Risk Assessment

The primary objective of the HHRA is to assess current and future health risks associated with exposure to Site 49 soil, surface water, sediment, and groundwater under current site conditions. The risk assessment is composed of the following components:

- **Identification of COPCs**—identification of the contaminants found onsite and selection of the COPCs. COPCs identified in this screening are the focus of the subsequent evaluation in the risk assessment.
- **Exposure Assessment**—identification of the potential pathways of human exposure, characterization of the potentially exposed populations, and estimation the magnitude, frequency, and duration of exposures.
- **Toxicity Assessment**— assessment of the potential adverse effects of the COPCs and compilation of the toxicity values used for developing numerical risk estimates.
- **Risk Characterization**—integration of the results of the exposure assessment and toxicity assessment to develop numerical estimates of health risks.
- **Uncertainty Assessment**—identification and discussion of sources of uncertainty associated with the data, methodology, and the values used in the risk assessment.

These components are described briefly in the following sections.

6.2.1 Identification of Constituents of Potential Concern

The identification of COPCs includes data collection, data evaluation, and data screening. The data used for the quantitative risk analysis were validated prior to use in the HHRA and met project-specific data quality objectives (DQOs). The data collection and evaluation steps were performed independently and involved gathering and reviewing the available site data to determine if the available analytical data were usable for risk assessment purposes (as in, they met DQOs and represent current conditions). Screening against human-health-risk-based criteria and background concentrations to identify COPCs further reduced the data set for each environmental medium quantitatively evaluated for the site.

Data Summary and Evaluation

Detailed results of the sampling at Site 49 are presented in Section 4. Groundwater samples collected in July 2009, February 2010, and April 2011 were evaluated in the HHRA. Soil data collected in July 2009 and March and April 2011 were evaluated in the HHRA. Sediment and surface water samples collected in the drainage ditches in March 2011 and sediment and porewater (used as representative of surface water) samples collected from the New River in March and April 2011 were evaluated in the HHRA. Surface soil samples were collected from depths of 0 to 0.5 ft bgs. Subsurface soil samples were collected at depths ranging from 1 to 9 ft bgs. Groundwater samples collected from permanent monitoring wells were evaluated in the risk assessment.

Table 6-1 lists the samples that were evaluated in the risk assessment. The full sets of data evaluated in the risk assessment are included in **Appendix F**. Unfiltered groundwater samples were analyzed in the risk assessment following USEPA Region 4 guidance (USEPA, 2000a).

All of the data selected for inclusion in the risk assessment were evaluated to determine the reliability of the data for use in the quantitative risk assessment. A review of the validated data identified the following criteria for data usability:

- Estimated values flagged with a J qualifier were treated as unqualified detected concentrations.

- Data qualified with an R (rejected) were not used in the risk assessment.
- Data qualified with a B (blank contamination) were used in the risk assessment as if the constituents were not detected, with the blank-related concentrations of each constituent used as the sample detection limit.
- For duplicate samples, the maximum concentration between the two samples was used as the sample concentration.

Selection of Constituents of Potential Concern

All of the detected constituents were screened according to the procedures described in the following sections. The maximum detected concentration of each constituent in each medium was compared to the following criteria to select the COPCs for the medium. If the maximum concentration exceeded the criteria, the constituent was selected as a COPC. Additionally, for constituents that were not detected, the maximum detection limit was compared to the screening criteria to identify those constituents with detection limits above the criteria. These constituents were not retained as COPCs for quantitative evaluation in the risk assessment, but are discussed in the uncertainty assessment. The COPC screening is presented in **Appendix F**, Tables 2.1 through 2.10.

- **Comparison with Health-based Criteria for Soil:** Soil data were compared to the USEPA residential soil RSLs (USEPA, 2011a). RSLs based on non-carcinogenic effects were divided by 10 to account for exposure to multiple constituents. RSLs based on carcinogenic effects were used as presented in the RSL table.
- **Comparison with Health-based Criteria for Ambient Air:** Concentrations of chemicals in air emanating from contaminated soil by volatilization or fugitive dust emissions were compared to the USEPA residential air RSLs. RSLs based on non-carcinogenic effects were divided by 10 to account for exposure to multiple constituents. RSLs based on carcinogenic effects were used as presented in the RSL table. The ambient air concentrations were calculated following USEPA's soil screening guidance (USEPA, 2002), as shown in **Appendix F**, Tables 2.2, 2.2A, and 2.8**.**
- **Comparison with Health-Based Criteria for Sediment:** Sediment data were compared to the USEPA residential soil RSLs (USEPA, 2011a). RSLs based on non-carcinogenic effects were divided by 10 to account for exposure to multiple constituents. RSLs based on carcinogenic effects were used as presented in the RSL table.
- **Comparison with Health-based Criteria for Surface Water:** Surface water data were compared to the lower of the NCSWQS for human health and water supply (NCDENR, 2010a) or the USEPA National Recommended Water Quality Criteria (NRWQC) (USEPA, 2009b) for human health for ingestion of water and aquatic organisms. Constituents without an NCSWQS or NRWQC standard were compared to the USEPA tap water RSL (USEPA, 2011a). RSLs based on non-carcinogenic effects were divided by 10 to account for exposure to multiple constituents. RSLs based on carcinogenic effects were used as presented in the RSL table. Constituents with a maximum detected concentration below the NCSWQS and NRWQC, or the RSL if no NCSWQS or NRWQC standards are available, were not retained as COPCs.
- **Comparison with Health-based Criteria for Groundwater:** Groundwater data were compared to the USEPA tap water RSLs (USEPA, 2011a). RSLs that are based on non-carcinogenic effects were divided by 10 to account for exposure to multiple constituents. RSLs based on carcinogenic effects were used as presented in the RSL table. Lead concentrations in groundwater were compared to the lead federal action level for drinking water of 15 μg/L (USEPA, 2009c). Groundwater data were also compared to the National Primary Drinking Water Regulations MCLs (USEPA, 2009c) and the NCGWQS (NCDENR, 2010b); however, these comparisons were not used to select the groundwater COPCs.
- **Comparison with Health-based Criteria for VI from Groundwater to Indoor Air:** The surficial groundwater data were compared to generic VI screening levels to help identify potentially complete VI pathways at the site for detected VOCs. Generic VI groundwater screening levels (GWSLs) were calculated using the methodology in Appendix D of the USEPA VI Guidance (USEPA, 2002). The target groundwater concentration (the GWSL) corresponding to a chemical's target indoor air concentration was calculated by dividing the target indoor air concentration (the USEPA RSLs for residential air and industrial air) by the default attenuation

factor (1E-03) and then converting the vapor concentration to an equivalent groundwater concentration, assuming equilibrium between the aqueous and vapor phases at the water table. The equation used to calculated the GWSL is (USEPA, 2002):

$$C_{gw}\ [\mu g/L] = C_{target,ia}\ (\mu g/m^3) * 10^{-3}\ m^3/L * 1/H'_{TS} * 1/\alpha$$

where,

Cgw	=	target groundwater concentration (GWSL)
$C_{target,ia}$	=	target indoor air concentration (RSLs for residential air)
MW	=	molecular weight (grams per mole [g/mole])
α	=	Adherence factor (AF) (default ratio of indoor air concentration to source vapor concentration; 1E-03)
H'_{TS}	=	Henry's Law Constant at system (groundwater) temperature (dimensionless)
$\mu g/m^3$	=	micrograms per cubic meter
m^3/L	=	cubic meters per liter

The dimensionless form of the K_h at the system temperature (that is, at the average groundwater temperature) was estimated using the following equation:

$$H'_{TS} = \frac{\exp\left[-\frac{\Delta H_{v,TS}}{RT_s}\left(\frac{1}{T_S} - \frac{1}{T_R}\right)\right] H_R}{RT_S}$$

where,

H'TS	=	Henry's Law Constant at the system temperature (dimensionless)
ΔHv,TS	=	Enthalpy of vaporization at the system temperature (calories per mole [cal/mol])
TS	=	System temperature (Kelvin [K])
TR	=	Henry's Law Constant reference temperature (K)
HR	=	Henry's Law Constant at the reference temperature (atm-m^3/M)
RC	=	Gas constant (= 1.9872 calories per mole per Kelvin [cal/mol-K])
R	=	Gas constant (= 8.205 E-05 atmosphere-cubic meters per mole per Kelvin [atm-m^3/M-K])

The enthalpy of vaporization at the system temperature is calculated using the following equation:

$$\Delta H_{v,TS} = \Delta H_{v,b}\left[\frac{(1 - T_S/T_C)}{(1 - T_B/T_C)}\right]^n$$

where,

ΔHv,TS	=	Enthalpy of vaporization at the system temperature (cal/mol)
ΔHv,b	=	Enthalpy of vaporization at the normal boiling point (cal/mol)
TS	=	System temperature (K)
TC	=	Critical temperature (K)
TB	=	Normal boiling point (K)
n	=	Constant (unitless) (The value of n is a function of the ratio of TB /TC)

If the maximum detected groundwater concentration was greater than the VI GWSL, the constituent was identified as a COPC for the VI pathway. COPCs were not carried forward in the HHRA evaluation. The exceedance of VI GWSLs is an indication that further evaluation (such as a multiple lines of evidence investigation) may be warranted. The residential and industrial VI GWSLs are presented in Tables F 2.10, F 2.10 Supplement A, F 2.11, and F 2.11 Supplement A of **Appendix F**.

- **Comparison to Background Concentrations**: Following USEPA Region 4 risk assessment guidance (USEPA, 2000a), the maximum detected concentrations of naturally occurring inorganic constituents in groundwater and soil were compared to two times the MCIEAST-MCB CAMLEJ Basewide background concentration (Baker Environmental, Inc. [Baker], 2001). Additionally, the maximum detected concentrations of constituents in surface water and sediment in the drainage ditches were compared to concentrations in the site-specific background samples IR49-SW01-11A and IR49-SD01-11A, respectively.

- **Essential Human Nutrients:** Constituents that are considered essential nutrients, present at low concentrations (that is, only slightly elevated above naturally occurring levels), and toxic only at very high doses were eliminated from the quantitative risk analysis. These constituents include calcium, magnesium, potassium, and sodium.

6.2.2 Summary of Constituents of Potential Concern

Table 6-2 identifies the constituents that were identified as COPCs for each of the exposure areas in each media.

There were no COPCs identified for surface soil, surface water or sediment in the drainage ditches, or surface water (porewater) or sediment in the New River.

Five metals (aluminum, arsenic, chromium, iron, and vanadium) were identified as COPCs for combined surface and subsurface soil. Chromium was identified as a COPC for the soil-to-air pathway for combined surface and subsurface soil.

Although only the wells from the center of the groundwater plume were used to quantify the risks associated with exposure to groundwater, data from all of the wells were screened to identify the COPCs. Ten VOCs (1,1,2,2-PCA, 1,1,2-TCA, 1,2-DCA, benzene, chloroform, *cis*-1,2-DCE, PCE, trans-1,2-dichlorothene, TCE, and VC) were identified as COPCs for groundwater. All 10 of the VOCs were also identified as COPCs for the groundwater to air pathway for exposure while showering, bathing, or in an excavation.

Nine VOCs (1,1,2,2-PCA, 1,1,2-TCA, benzene, *cis*-1,2-DCE, methylcyclohexane, PCE, trans-1,2-DCE, TCE, and VC) were detected at concentrations above GWSLs for the VI from groundwater to indoor air exposure pathway in a residential building. Six VOCs (1,1,2,2-PCA, 1,1,2-TCA, *cis*-1,2-DCE, methylcyclohexane, TCE, and VC) were detected at concentrations above VI GWSLs in an industrial building. However, groundwater is not expected to be a significant source of VI based on the lines of evidence provided as follows, and the exposure pathway was not evaluated further:

- The building currently onsite is over 100 ft from the impacted groundwater, is used for storage, and is only intermittently occupied. There are no future plans to construct additional buildings at the site.
- The VI pathway would need to be re-evaluated if future land use changes.

6.3 Exposure Assessment

Exposure assessment is the estimation of the likelihood, magnitude, frequency, duration, and routes of exposure to a chemical. Exposure refers to the potential contact of an individual (or receptor) with a chemical. Exposure can occur when contaminants migrate from a source to an exposure point, or when a receptor comes into direct contact with contaminated media.

The three components of exposure assessment include:

- Characterization of exposure setting
- Identification of exposure pathways
- Quantification of exposure

6.3.1 Characterization of Exposure Setting

A description of MCIEAST-MCB CAMLEJ is summarized in Section 6.2.1, the human health CSM. Additionally, Section 2.1.2 describes the facility-wide demography and land use, and Section 4 describes the physical setting, including the physiography, climate, surface water hydrology, topography, geology, and hydrogeology.

MCIEAST-MCB CAMLEJ is home to an active duty, dependent, retiree, and civilian population of approximately 150,000 personnel. Approximately 47,000 military personnel are stationed at MCIEAST-MCB CAMLEJ, including 39,000 Marines for resident formal school training and 8,000 Marines and Department of Defense (DoD) employees for job enhancement training. MCIEAST-MCB CAMLEJ provides housing, training facilities, logistical support, and administrative supplies for FMF units and other assigned units. Specific information on exposed populations for Site 49 was presented in the human health CSM discussion in Section 6.2.1. **Table 6-3** summarizes the potentially exposed populations at Site 49.

6.3.2 Identification of Exposure Pathways

An exposure pathway can be described as the physical course that a COPC takes from the point of release (or source) to a receptor. To be complete, an exposure pathway must have all of the following components:

- A source (such as constituent residues in soil)
- A mechanism for chemical release and migration (such as leaching)
- An environmental transport medium (such as groundwater)
- A point or site of potential human contact (an exposure point such as drinking water)
- A route of intake (such as ingestion of groundwater used as a drinking water source)

In the absence of any one of these components, an exposure pathway is considered incomplete and, by definition, there is no risk or hazard. In some cases, a receptor may contact a source directly, eliminating the release and transport pathways.

The potential exposure pathways for Site 49 were identified in the CSM (**Figure 6-1**) and **Appendix F**, Table 1.1.

Section 6.1 identifies the potential receptors and exposure pathways. Based on the media in which COPCs were identified (combined surface and subsurface soil and groundwater), there are no current exposures to contaminants at Site 49. Therefore, only future land use exposures were quantified in the HHRA.

The future land use exposure routes include:

- **Resident (adult and child)—**Incidental ingestion of and dermal contact with soil (combined surface and subsurface soil), inhalation of particulate and volatile emissions from soil (combined surface and subsurface soil), ingestion of groundwater, and inhalation and dermal contact with groundwater while showering or bathing

- **Construction Worker—**Incidental ingestion of and dermal contact with combined surface and subsurface soil), inhalation of particulate and volatile emissions from soil (combined surface and subsurface soil), and dermal contact with and inhalation of volatile emissions from groundwater

- **Industrial Worker—** Incidental ingestion of and dermal contact with soil (combined surface and subsurface soil), inhalation of particulate and volatile emissions from soil (combined surface and subsurface soil), and ingestion of groundwater

- **Site Worker—** Incidental ingestion of and dermal contact with combined surface and subsurface soil) and inhalation of particulate and volatile emissions from soil (combined surface and subsurface soil); site worker exposure is less frequent than the industrial worker exposure (site worker is assumed to be a groundskeeper)

- **Trespasser or Visitor (adult and youth)—**Incidental ingestion of and dermal contact with soil (combined surface and subsurface soil) and inhalation of particulate and volatile emissions from soil (combined surface and subsurface soil)

6.3.3 Quantification of Exposure

Exposure is quantified by estimating the exposure point concentrations (EPCs) of COPCs in environmental media and COPC intake by the receptor. Both reasonable maximum exposure (RME) and central tendency exposure (CTE) intakes were included in this evaluation. CTE intakes were calculated for exposure scenarios with RME cumulative cancer risks greater than 1×10^{-4} or cumulative non-cancer hazards greater than 1.

Exposure Concentrations

EPCs are estimated constituent concentrations that a receptor may contact and are specific to each exposure medium and exposure area. EPCs may be directly measured or estimated using environmental fate and transport models. Constituent concentrations in soil, surface water, sediment, and groundwater were measured for this assessment. Fate and transport modeling conducted for the Site 49 risk assessment included estimating fugitive dust and volatile emissions from soil following the methods in USEPA's Soil Screening Guidance Document (USEPA, 2002), as shown in Tables 2.2, 2.2A, and 2.8, **Appendix F**, estimating volatile emissions from groundwater while showering using the Foster and Chrostowski (1987) shower model for residential receptors (Table 7.1.RME Supplement B, Table 7.2.RME Supplement B, Table 7.1.CTE Supplement B, and Table 7.2.CTE Supplement B, **Appendix F**), and estimating volatile emissions from groundwater in an open excavation for a construction scenario using an ASTM Volatilization Model (Table 7.4.RME Supplement B in **Appendix F**).

The groundwater data used to calculate the groundwater EPC were selected in a manner consistent with USEPA Region 4 risk assessment guidance (USEPA, 2000a) to evaluate the high concentration area of the groundwater plume. Nine wells were selected to estimate the groundwater EPC (IR49-MW01, IR49-MW02, IR49-MW07, IR49-MW08, IR49-TW01, IR49-TW01R, IR49-TW05, IR49-TW06, and IR49-TW07) to evaluate risk for exposure to the center portion of the most contaminated portion of the site.

ProUCL software Version 4.1 (USEPA, 2010) was used to calculate the EPCs. ProUCL was used to determine the distribution that the data fit and to calculate the 95 percent upper confidence limits (UCLs) on the mean concentrations used as the RME EPCs and the mean concentrations used as the CTE EPCs. ProUCL identifies three possible data distributions: normal distribution, log-normal distribution, and gamma distribution. The UCL calculation method is then selected based on the data distribution (that is, normal, log-normal, gamma, or non-parametric if the data do not fit any of the distributions). The recommendations outlined in the ProUCL software documentation were followed to select the appropriate UCL (USEPA, 2010) and mean concentration. The maximum detected concentration was used as the RME EPC in cases where the estimated 95 percent UCL was greater than the maximum detected concentration, or less than five samples were available for a data grouping. The arithmetic mean concentration was used as the CTE EPC when less than five samples were available for a data grouping.

Appendix F, Tables 3.1.RME through 3.4.RME and 3.1.CTE through 3.4.CTE, present the EPCs for the COPCs for each medium and the rationale for the selected EPC.

Estimation of Chemical Intakes

Chemical intake is the amount of the chemical constituent entering the receptor's body. The quantification of exposure is based on an estimate of the chronic daily intake, the average amount of the chemical contaminant entering the receptor's body per day. Chemical intakes for the ingestion and dermal exposure pathways are generally expressed as follows:

$$CDI = \frac{C \times CR \times EF \times ED}{BW \times AT}$$

Where:

CDI = chronic daily intake (milligrams per kilogram per day [mg/kg-day])
C = chemical concentration (mg/L, mg/kg)
CR = contact rate (liters per day [L/day], milligrams per day [mg/day])
EF = exposure frequency (days per year [days/year])
ED = exposure duration (years)
BW = body weight (kg)
AT = averaging time (days)

For the dermal pathway, the contact rate usually incorporates the skin surface area in contact with the exposure medium (water or soil) and an absorption factor. The intake equation for the dermal exposure pathway is shown in **Appendix F**, Table 4.1 (RME and CTE) for soil and Table 4.3 (RME and CTE) for groundwater.

Chemical exposure estimates for the inhalation pathway are generally expressed as follows:

$$EC = \frac{Ca \times ET \times EF \times ED \times CF}{AT}$$

Where:

- EC = exposure concentration (milligrams per cubic meter [mg/m^3])
- Ca = chemical concentration in air (mg/m^3)
- ET = exposure time (hours per day)
- EF = exposure frequency (days/year)
- ED = exposure duration (years)
- CF = conversion factor (days per 24 hours)
- AT = averaging time (days)

The intake and exposure equations require exposure parameters that are specific to each exposure pathway. Many of the exposure parameters have default values, which were used for this assessment. These assumptions, based on estimates of body weights, media intake levels, and exposure frequencies and duration, are provided in USEPA guidance. Other assumptions (such as those for the trespasser or visitor scenarios) require consideration of location-specific information and were determined using professional judgment. Tables 4.1.RME through 4.4.RME and 4.1.CTE through 4.4.CTE in **Appendix F** identify the exposure parameters and intake equations for each of the scenarios evaluated in the risk assessment. CTE exposure parameters are only provided for scenarios where the RME risk was greater than USEPA's acceptable non-carcinogenic hazard or carcinogenic risk target levels, as these were the only CTE scenarios quantified in the risk assessment.

6.4 Toxicity Assessment

Toxicity assessment defines the relationship between the magnitude of exposure and possible severity of adverse effects and weighs the quality of available toxicological evidence. Toxicity assessment generally consists of two steps: hazard identification and dose-response assessment. Hazard identification is the process of determining the potential adverse effects from exposure to the constituent along with the type of health effect involved. Dose-response assessment is the process of quantitatively evaluating the toxicity information and characterizing the relationship between the dose of the constituent administered or received and the incidence of adverse health effects in the exposed population. Toxicity criteria (such as reference doses [RfDs], inhalation reference concentrations [RfCs], cancer slope factors [CSFs], and inhalation unit risk factors [IURs]) are derived from the dose-response relationship.

The USEPA recommends that a tiered approach be used to obtain the toxicity values, the RfDs, RfCs, CSFs, and IURs used to calculate non-cancer and cancer risks (USEPA, 2003). The hierarchy of toxicity value sources is as follows:

- USEPA's Integrated Risk Information System (IRIS) database (USEPA, 2011b)
- Provisional Peer Reviewed Toxicity Value (PPRTV)
- Other USEPA and non-USEPA sources, including the National Center for Environmental Assessment (NCEA), Agency for Toxic Substances and Disease Registry (ATSDR), Health Effects Assessment Summary Tables (USEPA, 1997b), California Environmental Protection Agency (Cal EPA), and USEPA's Office of Water

The use of toxicity values from sources other than IRIS increases the uncertainty of the quantitative risk estimates. If toxicity values were not available for a detected constituent, surrogate constituents were selected, if appropriate, and their RSLs were used for the COPC selection process. Surrogates were selected based on previous recommendations from USEPA. The surrogates are identified in Tables 2.1 through 2.10 in **Appendix F**. None of the constituents screened during the COPC selection process using surrogates were identified as COPCs.

Chromium is a COPC for soil and particulate emissions from soil. It was assumed that all of the chromium is hexavalent chromium (Cr[VI]), both for determining whether chromium was a COPC (comparing the total chromium concentrations to the Cr[VI] RSLs) and for calculating the risks associated with exposure to chromium in these media. Cr(VI) is unstable in the body (in biological tissues) and is ultimately reduced to trivalent chromium (Cr[III]) by a variety of reducing agents, including ascorbate and glutathione (ATSDR, 2008; USEPA, 2011b). An RfD and RfC for Cr(VI) are available in IRIS; however, IRIS does not include a CSF or IUR for Cr(VI). The CSF for Cr(VI) used in the HHRA is the same one included in the RSL Table (USEPA, 2011a) from the New Jersey Department of Environmental Protection (NJDEP).

Chronic and subchronic RfDs and RfCs, and associated uncertainty factors (UFs) and modifying factors (MFs), for the COPCs are listed in Tables 5.1 and 5.2 in **Appendix F**. CSFs and IURs are listed in Tables 6.1 and 6.2 in **Appendix F**.

Dermal RfDs and CSFs were estimated from the oral RfDs and CSFs using an oral-to-dermal adjustment factor, or gastrointestinal (GI) absorption factor. This factor is used to convert the orally administered dose toxicity factors to dermally absorbed dose toxicity factors (USEPA, 2004). The oral RfDs were converted to dermal RfDs by multiplying by the GI absorption factor, and the oral CSFs were converted to dermal CSFs by dividing by the GI absorption factor. If a chemical-specific GI absorption factor was not available or was greater than 50 percent, a GI absorption factor of 100 percent was assumed. The dermal RfDs are included in Table 5.1, **Appendix F**. The dermal CSFs are presented in Table 6.1, **Appendix F**.

6.4.1 Approach for Potential Mutagenic Effects

Consistent with the Cancer Guidelines and Supplemental Guidance (USEPA, 2005a and 2005b), cancer risks were estimated using age-dependent adjustment factors (ADAFs) for COPCs that act via a mutagenic mode of action (MMOA). Chromium and VC are the COPCs that are categorized as chemicals with an MMOA. The calculation of cancer risk using ADAFs is presented in Tables 7.3.RME Supplement A and 7.3.CTE Supplement A of **Appendix F**. Age-depended CSFs and IURs are available for VC and were used to estimate the risk from exposure to VC in groundwater to residents. As chemical-specific data are not available for chromium, default ADAFs, as included in the USEPA Region 3 Memorandum, *Derivation of Risk-Based Concentrations (RBCs) for Carcinogens that Act Via a Mutagenic Mode of Action and Incorporate Default ADAFs* (USEPA, 2006), were used for the MMOA evaluation. The default ADAFs used to adjust the CSF and IUR for chromium are 10 for 0 to 2 year olds, 3 for 2 to 6 year olds, 3 for 6 to 12 year olds, and 1 for 16 to 30 year olds. The CSF was multiplied by the appropriate ADAF to derive the age-specific CSF for a receptor to calculate the total carcinogenic risk. Additionally, the exposure factors for children 0 to 2 years old and 2 to 6 years old were assumed to be the same as the parameters for a child 0 to 6 years old, with the exception of the exposure duration, which was instead 2 years and 4 years, respectively. The exposure factors for the adult residential receptor were used for residents 6 to 16 years old and 16 to 30 years old, with the exception of the exposure durations, which were 10 years and 14 years, respectively.

6.5 Risk Characterization

Risk characterization combines the results of the previous elements of the risk assessment to evaluate the potential health risks associated with exposure to the COPCs.

6.5.1 Non-carcinogenic and Carcinogenic Risk Estimation Methods

Potential human health risks are discussed independently for carcinogenic and non-carcinogenic constituents because of the different toxicological endpoints, relevant exposure duration, and methods used to characterize risk. Some constituents may produce both non-carcinogenic and carcinogenic effects, and were evaluated in both groups. The methodology used to estimate non-carcinogenic hazards and carcinogenic risks are described as follows. Following the description of the methodology, the non-carcinogenic hazards and carcinogenic risks for Site 49 are discussed.

Non-carcinogenic Hazard Estimation

Non-carcinogenic health risks are estimated by comparing the calculated intake to an RfD (or exposure concentration to RfC). The calculated intake divided by the RfD (or exposure concentration divided by the RfC) is equal to the Hazard Quotient (HQ):

$$HQ = Intake / RfD \text{ or } Exposure\ Concentration / RfC$$

The intake and RfD (or exposure concentration and RfC) represent the same exposure period (that is, chronic or subchronic) and the same exposure route (for example, oral intakes are divided by oral RfDs, inhalation exposure concentrations are divided by inhalation RfCs). An HQ that exceeds 1 (that is, the intake exceeds the RfD) indicates that there is a potential for adverse health effects associated with exposure to that constituent.

To assess the potential for non-carcinogenic health effects posed by exposure to multiple constituents, a Hazard Index (HI) approach is used (USEPA, 1986). This approach assumes that non-carcinogenic hazards associated with exposure to more than one constituent are additive. Synergistic or antagonistic interactions between constituents are not considered. The HI may exceed 1 even if all of the individual HQs are less than 1. HIs are also added across exposure routes and media to estimate the cumulative non-carcinogenic health effects to a receptor posed by exposure through multiple routes and media. If the HI is greater than 1, separate HIs are estimated for each target organ to assess whether the HI for a specific target organ is greater than 1. A target-organ-specific HI greater than 1 indicates that there is some potential for adverse non-carcinogenic health effects associated with exposure to the COPCs, possibly warranting remedial action. If the HI for each target organ does not exceed 1, non-carcinogenic hazards are not expected.

Carcinogenic Risk Estimation

The potential for carcinogenic effects due to exposure to site-related constituents is evaluated by estimating the excess lifetime carcinogenic risk (ELCR). ELCR is the incremental increase in the probability of developing cancer during one's lifetime in addition to the background probability of developing cancer. For example, for an individual exposed to a carcinogen with a calculated cancer risk of 2×10^{-6}, the probability of the individual getting cancer increases by 2 in a million above background levels.

Carcinogenic risk is calculated by multiplying the intake by the CSF (or exposure concentration by the IUR).

$$ELCR = Intake \times CSF \text{ or } Exposure\ Concentration \times IUR$$

The combined risk from exposure to multiple constituents was evaluated by adding the risks from individual constituents. Risks were also added across the exposure routes and media if an individual would be exposed through multiple routes and to multiple media.

When a cumulative carcinogenic risk to an individual receptor under the assumed RME exposure conditions at the site exceeds 100 in a million (that is, 10^{-4} excess carcinogenic risk), the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) generally requires remedial action to reduce risks at the site (USEPA, 1991). If the cumulative risk is less than 10^{-4}, action is generally not required but may be warranted if a risk-based chemical-specific standard (for example, MCL) is exceeded.

6.5.2 Risk Assessment Results

The results of the risk characterization are presented as follows, by receptor. The risks are calculated in **Appendix F**, Tables 7.1.RME through 7.8.RME and Tables 7.1.CTE through 7.3.CTE. The risks are summarized in **Appendix F**, Tables 9.1.RME through 9.8.RME and 9.1.CTE through 9.3.CTE. A summary of the RME results is shown in **Table 6-4**, and a summary of the CTE results is shown in **Table 6-5**. CTE risks were calculated only when the RME hazard exceeded 1 or the RME carcinogenic risk exceeded 10^{-4}.

Future Adult Resident (non-carcinogenic hazard, Tables 9.1.RME and 9.1.CTE, Appendix F)

The risk assessment assumed that a future adult resident could be exposed to combined surface and subsurface soil through incidental ingestion, dermal contact, and inhalation of particulate emissions, as well as exposure to groundwater used as a potable water supply through ingestion and dermal contact and inhalation while showering. Carcinogenic risks were not calculated for an adult resident but were calculated for a lifetime resident, following USEPA guidance.

The RME non-carcinogenic hazard (4) is above USEPA's target HI of 1.The hazard associated with exposure to soil alone is below USEPA's target HI. The hazard associated with exposure to groundwater exceeds USEPA's target HI. In groundwater, *cis*-1,2-DCE is the only COPCs that contributes an individual HI above 1 and contributes to a target organ (kidney) with an HI above 1. Additional constituents in groundwater considered COCs since they contribute an HI above 0.1 to a total HI above 1 include 1,1,2-TCA, *trans*-1,2-DCE, and TCE. The CTE non-carcinogenic hazard (0.4) does not exceed USEPA's target HI.

Future Child Resident (non-carcinogenic hazard, Tables 9.2.RME and 9.2.CTE, Appendix F)

The risk assessment assumed that a future child resident could be exposed to combined surface and subsurface soil through incidental ingestion, dermal contact, and inhalation of particulate emissions, and exposure to groundwater used as a potable water supply through ingestion, and dermal contact and inhalation while bathing. Carcinogenic risks were not calculated for a child resident but were calculated for a lifetime resident, in accordance with USEPA guidance.

The RME non-carcinogenic hazard (9) is above USEPA's target HI of 1. The hazard associated with exposure to soil alone does not exceed USEPA's target HI. The hazard associated with potable use of groundwater exceeds USEPA's target HI. The hazard is primarily associated with *cis*-1,2-DCA, the only COPC that contributes an HI above 1. Additional constituents in groundwater considered COCs since they contribute an HI above 0.1 include 1,1,2,2-PCA, 1,1,2-TCA, *trans*-1,2-DCE, TCE, and VC. The CTE non-carcinogenic hazard (1) does not exceed USEPA's target HI.

Future Lifetime Resident (carcinogenic risk, Tables 9.3.RME and 9.3.CTE, Appendix F)

The risk assessment assumed that a lifetime resident could be exposed to combined surface and subsurface soil through incidental ingestion, dermal contact, and inhalation of particulate emissions, as well as groundwater used as a potable water supply through ingestion and dermal contact and inhalation showering.

The RME carcinogenic risk ($7x10^{-4}$) is above USEPA's target risk range of 10^{-6} to 10^{-4}. The risk associated with exposure to soil ($1x10^{-4}$) equals, but does not exceed, the upper limit of the target risk range. This risk from soil is primarily associated with chromium, based on the assumption that all of the detected chromium is Cr(VI), the more toxic (and carcinogenic) form of chromium. As discussed in Section 6.4, this assumption likely over-estimates the risk associated with chromium in the soil. In the past, prior to including the NJDEP oral CSF for Cr(VI) in the table, USEPA's RSL table presented a residential soil RSL for total chromium assuming a 1:6 ratio of Cr(VI) to Cr(III). Assuming this ratio applies for soil at Site 49, the EPC for Cr(VI) (the total measured chromium EPC multiplied by 1/6) would not result in an unacceptable risk associated with exposure to the chromium, and the risk associated with exposure to soil would be lower than 10^{-4}. It should also be noted that there is some uncertainty associated with the Cr(VI) oral CSF, as the value is from NJDEP and has not been included in USEPA's IRIS database.

The risk associated with potable use of the groundwater ($6x10^{-4}$) exceeds USEPA's target risk range. The risk is primarily associated with 1,1,2,2-PCA and VC, which each contribute risks above 10^{-4}. Additional constituents in groundwater considered COCs since they contribute risk above 10^{-6} to a cumulative risk above 10^{-4} include 1,1,2-TCA, 1,2-DCA, benzene, PCE, and TCE.

The CTE carcinogenic risk ($2x10^{-4}$) is also above USEPA's target risk range of 10^{-6} to 10^{-4}

Future Construction Worker (Table 9.4.RME, Appendix F)

The risk assessment assumed that a future construction worker could be exposed to combined surface and subsurface soil through incidental ingestion, dermal contact, and inhalation of particulate emission from soil, as well as to groundwater in an excavation through dermal contact and inhalation.

The RME non-carcinogenic hazard (0.3) is below USEPA's target HI of 1. The RME carcinogenic risk ($2x10^{-6}$) is within USEPA's target risk range of $1x10^{-6}$ to $1x10^{-4}$.

Future Industrial Worker (Table 9.5.RME, Appendix F)

The risk assessment assumed that a future industrial worker could be exposed to combined surface and subsurface soil through incidental ingestion, dermal contact, and inhalation of particulate emissions, as well as groundwater used as a potable water supply through ingestion.

The RME non-carcinogenic hazard (0.8) is below USEPA's target HI of 1. The RME carcinogenic risk ($1x10^{-4}$) equals the upper end of USEPA's target risk range of $1x10^{-6}$ to $1x10^{-4}$.

Future Site Worker (Table 9.6.RME, Appendix F)

The risk assessment assumed that a future site worker, performing grounds keeping activities or occasionally accessing the site, could be exposed to combined surface and subsurface soil through incidental ingestion, dermal contact, and inhalation of particulate emissions.

The RME non-carcinogenic hazard (0.02) is below USEPA's target HI of 1. The RME carcinogenic risk ($2x10^{-6}$) is within USEPA's target risk range of $1x10^{-6}$ to $1x10^{-4}$.

Future Adult Trespasser or Visitor (Table 9.7.RME, Appendix F)

The risk assessment assumed that a future adult trespasser or visitor could be exposed to combined surface and subsurface soil via incidental ingestion, dermal contact, and inhalation of particulate emissions. The RME non-carcinogenic hazard (0.02) is below USEPA's target HI of 1. The RME carcinogenic risk ($2x10^{-6}$) is within USEPA's target risk range of $1x10^{-6}$ to $1x10^{-4}$.

Future Youth Trespasser or Visitor (Table 9.8.RME, Appendix F)

The risk assessment assumed that a future youth trespasser or visitor could be exposed to combined surface and subsurface soil via incidental ingestion, dermal contact, and inhalation of particulate emissions. The RME non-carcinogenic hazard (0.03) is below USEPA's target HI of 1. The RME carcinogenic risk ($1x10^{-6}$) is within USEPA's target risk range of $1x10^{-6}$ to $1x10^{-4}$.

6.6 Uncertainty Associated with Human Health Assessment

The risk measures used in HHRAs are not fully probabilistic estimates of risk, but are conditional estimates given that a set of assumptions about exposure and toxicity are realized. Thus it is important to specify the assumptions and uncertainties inherent in the risk assessment to place the risk estimates in proper perspective (USEPA, 1989).

General Uncertainty in Constituent of Potential Concern Selection

The sampling that was conducted at Site 49 generally focused on areas of known or suspected impact from past site use, based on previous sampling information. Therefore, the uncertainty in sampling and possibility of missing a location impacted by site constituents is expected to be minimal. The uncertainty associated with the data analysis is minimal, as the data were fully validated prior to use in the risk assessment.

The general assumptions used in the COPC selection process were conservative to ensure that true COPCs were not eliminated from the quantitative risk assessment and that the highest possible risk was estimated. RSLs based on residential assumptions were used to select the COPCs for all of the scenarios, including non-residential scenarios.

Results of the COPC selection indicated a few VOCs may be present in groundwater at concentrations that exceed generic VI GWSLs for the VI pathway. The VI GWSLs were conservatively based on residential or industrial exposure scenarios (RSLs for residential or industrial air) and USEPA's default AF of 0.001 for groundwater. One building is currently located on the site; however, this building is used for storage and is only intermittently occupied. Therefore, exposure to COPCs in indoor areas is considered insignificant. There are no plans for future development of the site. The AF used is a generic AF recommended by USEPA. Because the generic AF is not based on site-specific subsurface data, the GWSLs used in the screening of groundwater may underestimate or overestimate the potential for VI. Also, the development of the screening levels does not take into account a chemical's soil adsorption characteristics. Therefore, the quantity and magnitude of COPCs associated with the VI exposure pathway from groundwater are likely overstated for these site conditions.

Uncertainty Associated with Exposure Assessment

Site-related contamination is expected to decrease with time due to naturally occurring attenuation processes (such as degradation due to weathering, volatilization, advection, dispersion, leaching due to infiltrating precipitation, and so forth). The risk assessment assumed concentrations would remain constant throughout the exposure period and that these concentrations occur everywhere throughout the site. This assumption likely results in an over-estimation of risk.

Uncertainty in the exposure assessment was generally treated with conservative decision rules and assumptions, and therefore, the uncertainty likely overestimates actual exposure to COPCs. Several exposure pathways evaluated by this HHRA, such as assuming residential homes will be constructed at Site 49 in the future, are hypothetical and are not anticipated to exist in the future. Additionally, it is not likely that the groundwater would ever be used as a potable or industrial supply.

The exposure factors used for the quantitation of exposure were conservative and reflect worst-case or upper-bound assumptions regarding exposure. The reliability of the values chosen for the exposure factors also contributes substantially to the uncertainty of the resulting risk estimates. Because most of the exposure factors are worst-case or upper-bound assumptions, the resulting risks are worst-case and likely overestimate the actual risk.

The future soil exposure scenario adds additional conservatism by assuming that the subsurface soil will become surface soil during any future construction activities, and that future receptors may come in contact with what is the current surface soil and current subsurface soil in the future. During many construction projects, clean fill material such as topsoil is placed over the soil that is disturbed during excavation projects. The topsoil material is generally needed to support growth of grass and other landscape plants. This would decrease the possibility of future exposure to both the current surface and subsurface soil after any construction activities.

Uncertainty Associated with Toxicity Assessment

Uncertainty associated with the non-carcinogenic toxicity factors is included in **Appendix F**, Tables 5.1 and 5.2. Several UFs were applied by USEPA to extrapolate dose points from animal studies to humans. These UFs range between 1 and 10,000. Additional modification factors are also used based on the professional judgment of the USEPA. Therefore, there is a high degree of uncertainty in the non-carcinogenic toxicity criteria, based on the available scientific data for each constituent. The non-carcinogenic toxicity factors are most likely an overestimate of actual toxicity.

The uncertainty associated with CSFs and IURs is mostly due to the low dose extrapolation, where carcinogenicity at low doses is assumed to be a linear response. This is a conservative assumption, which introduces a high uncertainty into slope factors and unit risk factors that are extrapolated from this area of the dose-response curve. The CSFs and IURs are based on the assumption that there is no threshold level for carcinogenicity; however, most of the experimental studies indicate the existence of a threshold level. Therefore, CSFs and IURs developed by USEPA represent upper-bound estimates. Carcinogenic risks generated in this assessment should be regarded as an upper-bound estimate on potential carcinogenic risks, rather than an accurate representation of carcinogenic risk. The true carcinogenic risk is likely to be less than the predicted value (USEPA, 1989). Uncertainty is also associated with the application of the MMOA for VC and chromium; this may over-estimate or under-estimate risks. Additionally, the generic ADAFs were used in the MMOA calculations for chromium, as no chromium-specific ADAFs are available.

Additional uncertainty is associated with the prediction of relative sensitivities of different species of animals and the applicability of animal data to humans.

Use of provisional or withdrawn toxicity factors increases the uncertainty of the quantitative hazard and risk estimates. Provisional toxicity values (from Cal EPA, New York Environmental Protection Agency [NY EPA], PPRTV, ATSDR, and the Health Effects Assessment Summary [HEAST]) were used in the HHRA. The provisional values were used to provide a quantitative estimate rather than a merely qualitative risk discussion; however, USEPA has not fully promulgated these toxicity values.

There is a large degree of uncertainty associated with the oral-to-dermal adjustment factors (based on constituent-specific GI absorption factors) used to transform the oral RfDs and CSFs based on administered doses to dermal RfDs and CSFs based on absorbed doses. It is not known if the adjustment factor results in an under-estimation or over-estimation of the actual toxicity associated with dermal exposure.

Uncertainty in Risk Characterization

The uncertainties identified in each component of risk assessment ultimately contribute to uncertainty in risk characterization. The addition of risks and HIs across pathways and chemicals contributes to uncertainty based on the interaction of chemicals such as additivity, synergism, potentiation, and susceptibility of exposed receptors. The simple assumption of additivity used for this site may or may not be accurate and may over- or under-estimate risk; however, a better alternative is not available at this time.

6.7 Human Health Risk Summary

Human health risks were evaluated for exposure to Site 49 for the following media and receptors:

- Surface soil for current site workers and trespassers or visitors (adult and youth); risks were not quantified for this medium since no COPCs were identified in surface soil
- Surface water and sediment in the drainages for current and future site workers, trespassers or visitors (adult and youth), and future construction workers and surface water and sediment in the New River for recreational users (adult, youth, and child); risks were not quantified for these media since no COPCs were identified in surface water or sediment
- Combined surface and subsurface soil for future adult and child residents, construction workers, industrial workers, site workers, and trespassers or visitors (adult and youth)
- Groundwater for future adult and child residents, industrial workers, and construction workers
- VI for future adult and child residents and industrial workers.

Table 7.3 and Tables 9.1.RME through 9.8.RME in **Appendix F** summarize the RME cancer risks and hazard indices. **Table 6-4** and Tables 9.1.CTE through 9.3.CTE in **Appendix F** summarize the CTE cancer risks and hazard indices. Tables 10.1.RME through 10.3.RME show only the COCs, the constituents that contributed HIs above 0.1 to total cumulative receptor HIs greater than 1, or carcinogenic risks greater than 10^{-6} to total cumulative receptor carcinogenic risks greater than 10^{-4}.

There were no COPCs identified for surface soil, surface water, or sediment, and therefore there are no unacceptable risks associated with exposure to these media. There were no unacceptable risks identified from future exposure to surface and subsurface soil. Additionally, no unacceptable risks were identified for industrial workers and construction workers from exposure to groundwater. However, potential future potable use of groundwater by residents may result in risk or hazards above USEPA's acceptable risk range and hazard levels. The non-carcinogenic hazard for the future resident is primarily associated with ingestion of *cis*-1,2-DCE. The carcinogenic risk is primarily associated with ingestion of 1,1,2,2-PCE and VC. The COCs for groundwater are those constituents that contribute an HI above 0.1 (to the total HI that is above 1) or a cancer risk above 10^{-6} (to the total cancer risk that is above 10^{-4}) and include 1,1,2,2-PCA, 1,1,2-TCA, 1,2-DCA, benzene, *cis*-1,2-DCE, PCE, trans-1,2-DCE, TCE, and VC. The residential land use scenario evaluated in this assessment is very conservative, since it is likely that current land use will not change. VOCs (1,1,2,2-PCA, 1,1,2-TCA, *cis*-1,2-DCE, methylcyclohexane, TCE, and VC) were detected in groundwater at concentrations above VI GWSLs for an industrial building. However, there is no current building within 100 ft of the impacted groundwater. Therefore, the VI pathway is currently incomplete but would need to be re-evaluated if future land uses changes.

TABLE 6-1

Samples Used in the Risk Assessment

Site 49 Remedial Investigation/Feasibility Study

MCIEAST-MCB CAMLEJ, North Carolina

Medium	Date of Sampling	Sample Location	Sample	Parameters
Surface Soil				
	3/29/2011	IR49-SS02	IR49-SS02-11A	VOCs
	3/29/2011	IR49-SS03	IR49-SS03-11A	VOCs
	3/29/2011	IR49-SS04	IR49-SS04-11A	VOCs
	3/29/2011	IR49-SS05	IR49-SS05-11A	VOCs
	3/29/2011	IR49-SS06	IR49-SS06-11A	VOCs
	3/29/2011	IR49-SS07	IR49-SS07-11A	VOCs
	4/18/2011	IR49-SS08	IR49-SS08-11B	VOCs
	3/28/2011	IR49-SS09	IR49-SS09-11A	VOCs
	3/28/2011	IR49-SS09	IR49-SS09D-11A[1]	VOCs
	3/28/2011	IR49-SS10	IR49-SS10-11A	VOCs
	3/28/2011	IR49-SS11	IR49-SS11-11A	VOCs
	3/28/2011	IR49-SS12	IR49-SS12-11A	VOCs
	4/18/2011	IR49-SS12	IR49-SS12D-11B	VOCs
	4/18/2011	IR49-SS13	IR49-SS13-11B	VOCs
Surface Water				
Surface Water	3/29/2011	IR49-SD02/SW02	IR49-SW02-11A	VOCs
Drainage Ditches	3/29/2011	IR49-SD02/SW02	IR49-SW02D-11A[1]	VOCs
	3/29/2011	IR49-SD03/SW03	IR49-SW03-11A	VOCs
Pore Water	4/2/2011	IR49-SD04/PW01	IR49-PW01-11A	VOCs
New River	4/1/2011	IR49-SD05/PW02	IR49-PW02-11A	VOCs
	4/1/2011	IR49-SD05/PW02	IR49-PW02D-11A[1]	VOCs
	4/1/2011	IR49-SD06/PW03	IR49-PW03-11A	VOCs
Sediment				
Drainage Ditches	3/29/2011	IR49-SD02/SW02	IR49-SD02-11A	VOCs
	3/29/2011	IR49-SD02/SW02	IR49-SD02D-11A[1]	VOCs
	3/29/2011	IR49-SD03/SW03	IR49-SD03-11A	VOCs
New River	4/18/2011	IR49-SD04/PW01	IR49-SD04-11B	VOCs
	3/30/2011	IR49-SD05/PW02	IR49-SD05-11A	VOCs
	4/18/2011	IR49-SD06/PW03	IR49-SD06-11B	VOCs
Subsurface Soil				
	7/08/2009	IR49-IS01	IR49-IS01-7-8-09C	VOCs, SVOCs, Metals
	7/08/2009	IR49-IS01	IR49-IS01D-7-8-09C[1]	VOCs, SVOCs, Metals
	7/09/2009	IR49-IS02	IR49-IS02-6-7-09C	VOCs, SVOCs, Metals
	3/31/2011	IR49-MW01	IR49-SB09-3-4-11A	VOCs
	3/31/2011	IR49-MW02	IR49-SB10-3-4-11A	VOCs
	3/31/2011	IR49-MW03	IR49-SB11-2-3-11A	VOCs
	3/31/2011	IR49-MW04	IR49-SB12-1_5-2-11A	VOCs
	3/31/2011	IR49-MW05	IR49-SB13-1_5-2-11A	VOCs
	4/01/2011	IR49-MW05	IR49-SB13D-1_5-2-11A	VOCs
	3/31/2011	IR49-MW06	IR49-SB14-0_5-1-11A	VOCs

TABLE 6-1

Samples Used in the Risk Assessment

Site 49 Remedial Investigation/Feasibility Study

MCIEAST-MCB CAMLEJ, North Carolina

Medium	Date of Sampling	Sample Location	Sample	Parameters
Groundwater				
	4/01/2011	IR49-MW01	IR49-GW01-11A[2]	VOCs
	4/01/2011	IR49-MW02	IR49-GW02-11A[2]	VOCs
	4/02/2011	IR49-MW03	IR49-GW03-11A	VOCs
	4/01/2011	IR49-MW04	IR49-GW04-11A	VOCs
	4/01/2011	IR49-MW05	IR49-GW05-11A	VOCs
	4/01/2011	IR49-MW06	IR49-GW06-11A	VOCs
	4/02/2011	IR49-MW07	IR49-GW07-11A[2]	VOCs
	4/02/2011	IR49-MW07	IR49-GW07D-11A[1, 2]	VOCs
	4/02/2011	IR49-MW08	IR49-GW08-11A[2]	VOCs
	7/12/2009	IR49-TW01	IR49-TW01-09C[2]	VOCs, SVOCs, Metals
	7/12/2009	IR49-TW01	IR49-TW01D-09C[1, 2]	VOCs, SVOCs, Metals
	2/18/2010	IR49-TW01R	IR49-TW01R-10A[2]	VOCs
	2/19/2010	IR49-TW04	IR49-TW04-10A	VOCs
	2/18/2010	IR49-TW05	IR49-TW05-10A[2]	VOCs
	2/18/2010	IR49-TW06	IR49-TW06-10A[2]	VOCs
	2/18/2010	IR49-TW07	IR49-TW07-10A[2]	VOCs
	2/18/2010	IR49-TW08	IR49-TW08-10A	VOCs

Notes:

[1] Duplicate sample of sample listed above

[2] Sample included in groundwater plume used to calculate exposure point concentration

VOCs = Volatile organic constituents

SVOCs = Semi-volatile organic constituents

TABLE 6-2

Summary of COPCs

Site 49 Remedial Investigation/Feasibility Study

MCIEAST-MCB CAMLEJ, North Carolina

Surface Soil and Subsuface Soil Combined
Aluminum
Arsenic
Chromium
Iron
Vanadium
Air
Chromium
Groundwater
1,1,2,2-Tetrachloroethane
1,1,2-Trichloroethane
1,2-Dichloroethane
Benzene
Chloroform
cis-1,2-Dichloroethene
Tetrachloroethene
trans-1,2-Dichloroethene
Trichloroethene
Vinyl chloride
Air
1,1,2,2-Tetrachloroethane
1,1,2-Trichloroethane
1,2-Dichloroethane
Benzene
Chloroform
cis-1,2-Dichloroethene
Tetrachloroethene
trans-1,2-Dichloroethene
Trichloroethene
Vinyl chloride

TABLE 6-3

Potentially Complete Human Health Exposure Pathways

Conceptual Site Model

Site 49 Remedial Investigation/Feasibility Study

MCIEAST-MCB CAMLEJ, North Carolina

Land Use	Exposure Media	Potentially Exposed Populations	Exposure Route (Human Health)	Pathway Selected for Evaluation	Rationale
Current					
Industrial	Surface soil	Site Worker	Ingestion, Dermal Contact and Inhalation	Yes	Workers could ingest, inhale and/or have dermal contact with surface soil at site.
Industrial	Surface soil	Trespasser/Visitor - Adults and Youth	Ingestion, Dermal Contact and Inhalation	Yes	Access to site unlimited for people on base, trespasser could ingest, inhale and/or have dermal contact with surface soil at site.
Industrial	Surface Water in Drainage Ditches	Site Worker	Ingestion and Dermal Contact	Yes	Personnel may access site for work related activities, and while at site may contact surface water in drainage ditches
Residential/Industrial	Surface Water in Drainage Ditches	Trespasser/Visitor - Adults and Youth	Ingestion and Dermal Contact	Yes	Access to site unlimited for people on base; trespasser/visitor could contact surface water in drainage ditches.
Residential/Industrial	Surface Water in New River	Recreational User - Adult, Youth, and Child	Ingestion and Dermal Contact	Yes	Recreational users of the New River could contact surface water (represented by pore water data) in the river.
Residential/Industrial	Sediment in Drainage Ditches	Site Worker	Ingestion and Dermal Contact	Yes	Personnel may access site for work related activities, and while at site may contact sediment in drainage ditches
Residential/Industrial	Sediment in Drainage Ditches	Trespasser/Visitor - Adults and Youth	Ingestion and Dermal Contact	Yes	Access to site unlimited for people on base; trespasser/visitor could contact sediment in drainage ditches.
Residential/Industrial	Sediment in New River	Recreational User - Adult, Youth, and Child	Ingestion and Dermal Contact	Yes	Recreational users of the New River could contact sediment in the river.
Future					
Residential	Surface and Subsurface soil, Groundwater	Residents - Adults and Children	Ingestion, Dermal Contact and Inhalation	Yes	Although unlikely, if site used for future residential development, residents could ingest, inhale or have dermal contact with surface and subsurface soil
Industrial	Surface and Subsurface soil, Groundwater	Construction Worker, Industrial Worker	Ingestion, Dermal Contact and Inhalation	Yes	If future site use is industrial, future workers could ingest, inhale or have dermal contact with surface and subsurface soil. Future workers could ingest groundwater
Residential/Industrial	Surface and Subsurface Soil	Site Worker	Ingestion, Dermal Contact and Inhalation	Yes	If future site use is industrial, future workers could ingest, inhale or have dermal contact with surface and subsurface soilgroundwater.
Trespasser/Visitor	Surface and Subsurface soil	Trespasser/Visitor - Adults, Youth and Child	Ingestion, Dermal Contact and Inhalation	Yes	Access to site unlimited for people on base, trespasser/visitor could ingest, inhale or have dermal contact with surface and subsurface soils onsite.

TABLE 6-4

Summary of RME Cancer Risks and Hazard Indices

Site 49 Remedial Investigation/Feasibility Study

MCIEAST-MCB CAMLEJ, North Carolina

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks $>10^{-4}$	Chemicals with Cancer Risks $>10^{-5}$ and $<10^{-4}$	Chemicals with Cancer Risks $>10^{-6}$ and $<10^{-5}$	Hazard Index	Chemicals with HI>1
Future Resident Adult	Soil*	Ingestion	N/A				0.1	
		Dermal Contact	N/A				0.006	
		Inhalation	N/A				0.0002	
		Total	N/A				0.1	
	Groundwater	Ingestion	N/A				2	cis-1,2-Dichloroethene
		Dermal Contact	N/A				0.2	
		Inhalation	N/A				2	
		Total	N/A				4	cis-1,2-Dichloroethene
	All Media	Total	N/A				4	
Future Resident Child	Soil*	Ingestion	N/A				1	
		Dermal Contact	N/A				0.04	
		Inhalation	N/A				0.0002	
		Total	N/A				1	
	Groundwater	Ingestion	N/A				4	cis-1,2-Dichloroethene
		Dermal Contact	N/A				0.4	
		Inhalation	N/A				3	
		Total	N/A				8	cis-1,2-Dichloroethene
	All Media	Total	N/A				9	
Future Resident Child/Adult	Soil*	Ingestion	1E-04		Arsenic, Chromium		N/A	
		Dermal Contact	1E-05		Chromium	Arsenic	N/A	
		Inhalation	2E-06			Chromium	N/A	
		Total	1E-04		Arsenic, Chromium	Chromium	N/A	
	Groundwater	Ingestion	4E-04	1,1,2,2-Tetrachloroethane, Vinyl Chloride		1,1,2-Trichloroethane, Tetrachloroethene, Trichloroethene	N/A	
		Dermal Contact	4E-05		1,1,2,2-Tetrachloroethane	Tetrachloroethene, Trichloroethene, Vinyl Chloride	N/A	
		Inhalation	1E-04		1,1,2,2-Tetrachloroethane	1,1,2-Trichloroethane, Trichloroethene, Vinyl Chloride	N/A	
		Total	6E-04	1,1,2,2-Tetrachloroethane, Vinyl Chloride	Tetrachoroethene, Trichloroethene	1,1,2-Trichloroethane, 1,2-Dichloroethane, Benzene	N/A	
	All Media	Total	7E-04				N/A	

TABLE 6-4

Summary of RME Cancer Risks and Hazard Indices

Site 49 Remedial Investigation/Feasibility Study

MCIEAST-MCB CAMLEJ, North Carolina

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks $>10^{-4}$	Chemicals with Cancer Risks $>10^{-5}$ and $<10^{-4}$	Chemicals with Cancer Risks $>10^{-6}$ and $<10^{-5}$	Hazard Index	Chemicals with HI>1
Future Construction Worker	Soil*	Ingestion	1E-06				0.2	
		Dermal Contact	8E-08				0.005	
		Inhalation	6E-09				0.00005	
		Total	1E-06				0.2	
	Groundwater	Ingestion	N/A				N/A	
		Dermal Contact	4E-07				0.01	
		Inhalation	2E-10				0.00009	
		Total	4E-07				0.01	
	All Media	Total	2E-06				0.3	
Future Industrial Worker	Soil*	Ingestion	8E-06			Arsenic, Chromium	0.08	
		Dermal Contact	2E-06			Chromium	0.007	
		Inhalation	1E-07				0.00005	
		Total	1E-05			Arsenic, Chromium	0.09	
	Groundwater	Ingestion	9E-05		1,1,2,2-Tetrachloroethane, Vinyl Chloride	Tetrachloroethene, Trichloroethene	0.7	
		Dermal Contact	N/A				N/A	
		Inhalation	N/A				N/A	
		Total	9E-05		1,1,2,2-Tetrachloroethane, Vinyl Chloride	Tetrachloroethene, Trichloroethene	0.7	
	All Media	Total	1E-04				0.8	
Future Site Worker	Soil*	Ingestion	2E-06				0.02	
		Dermal Contact	4E-07				0.001	
		Inhalation	3E-08				0.00001	
		Total	2E-06			Chromium	0.02	
	All Media	Total	2E-06				0.02	
Future Trespasser/Visitor Adult	Soil*	Ingestion	2E-06				0.02	
		Dermal Contact	2E-07				0.0009	
		Inhalation	7E-09				0.000003	
		Total	2E-06			Chromium	0.02	
	All Media	Total	2E-06				0.02	
Future Trespasser/Visitor Youth	Soil*	Ingestion	1E-06				0.03	
		Dermal Contact	7E-08				0.0006	
		Inhalation	3E-09				0.000003	
		Total	1E-06				0.03	
	All Media	Total	1E-06				0.03	

N/A = Not available/not applicable

Soil* - surface soil and subsurface soil combined.

TABLE 6-5

Summary of CTE Cancer Risks and Hazard Indices

Site 49 Remedial Investigation/Feasibility Study

MCIEAST-MCB CAMLEJ, North Carolina

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks >10^{-4}	Chemicals with Cancer Risks >10^{-5} and <10^{-4}	Chemicals with Cancer Risks >10^{-6} and <10^{-5}	Hazard Index	Chemicals with HI>1
Future Resident Adult	Soil*	Ingestion	N/A				0.03	
		Dermal Contact	N/A				0.0004	
		Inhalation	N/A				0.0001	
		Total	N/A				0.03	
	Groundwater	Ingestion	N/A				0.3	
		Dermal Contact	N/A				0.03	
		Inhalation	N/A				0.08	
		Total	N/A				0.4	
	All Media	Total	N/A				0.4	
Future Resident Child	Soil*	Ingestion	N/A				0.3	
		Dermal Contact	N/A				0.004	
		Inhalation	N/A				0.0001	
		Total	N/A				0.3	
	Groundwater	Ingestion	N/A				1	
		Dermal Contact	N/A				0.05	
		Inhalation	N/A				0.1	
		Total	N/A				1	
	All Media	Total	N/A				1	
Future Resident Child/Adult	Soil*	Ingestion	3E-05		Chromium	Arsenic	N/A	
		Dermal Contact	9E-05			Chromium	N/A	
		Inhalation	1E-06				N/A	
		Total	1E-04		Chromium	Arsenic	N/A	
	Groundwater	Ingestion	5E-05		Vinyl chloride	1,1,2,2-Tetrachloroethane, Tetrachloroethene, Trichloroethene, Vinyl Chloride	N/A	
		Dermal Contact	3E-06				N/A	
		Inhalation	9E-07				N/A	
		Total	5E-05		1,1,2,2-Tetrachloroethane, Vinyl Chloride	Tetrachloroethene, Trichloroethene	N/A	
	All Media	Total	2E-04				N/A	

N/A = Not available/not applicable
Soil* - surface soil and subsurface soil combined.

Potential Human Receptors

Primary Source	Primary Release Mechanism	Secondary Source	Secondary Release Mechanism	Exposure Media	Exposure Route	Future: Residential Adult	Future: Residential Child	Future: Construction Worker	Future: Industrial Worker	Current/Future: Recreational User (Adult, Youth and Child)[2]	Current/Future: Trespasser/ Visitor Adult[2]	Current/Future: Trespasser/ Visitor Youth[2]	Current/Future: Trespasser/ Visitor Child[2]	Current/Future: Site Worker
Suspected Minor Dump - Paint Related Waste	Leaks/Spills	Soil		Surface Soil[1]	Ingestion	NA	NA	NA	NA	NA	X	X	X	X
					Dermal Contact	NA	NA	NA	NA	NA	X	X	X	X
					Inhalation	NA	NA	NA	NA	NA	X	X	X	X
				Surface and Subsurface Soil[1]	Ingestion	X	X	X	X	NA	X	X	X	X
					Dermal Contact	X	X	X	X	NA	X	X	X	X
					Inhalation	X	X	X	X	NA	X	X	X	X
			Leaching	Groundwater	Ingestion	X	X	NA	NA	NA	NA	NA	NA	NA
					Dermal Contact	X	X	X	NA	NA	NA	NA	NA	NA
					Inhalation	X	X	X	NA	NA	NA	NA	NA	NA
			Runoff	Surface Water	Ingestion	NA	NA	X	NA	X	X	X	X	X
					Dermal Contact	NA	NA	X	NA	X	X	X	X	X
					Inhalation	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Runoff	Sediment	Ingestion	NA	NA	X	NA	X	X	X	X	X
					Dermal Contact	NA	NA	X	NA	X	X	X	X	X
					Inhalation	NA	NA	NA	NA	NA	NA	NA	NA	NA

[1] Current exposure evaluated for surface soil, and future exposure evaluated for surface soil and subsurface soil

[2] Recreational User exposed to surface water and sediment in the New River. Trespasser/Visitor, construction worker, and site worker exposed to surface water and sediment in the drainage ditches.

NA - Not Applicable or pathway is incomplete

X - Potentially complete exposure pathways

FIGURE 6-1

Conceptual Site Model for HHRA
Site 49
MCIEAST MCB CAMLEJ, North Carolina

SECTION 7

Ecological Risk Assessment

7.1 Introduction

The following Ecological Risk Assessment (ERA) completes Steps 1 through 3a of the ERA process for Site 49. This ERA evaluates surface soil, subsurface soil, groundwater, surface water, sediment, and porewater data that were collected at Site 49 in 2009, 2010, and 2011. The ERA was performed in accordance with the following guidance:

- *Ecological Risk Assessment Guidance for Superfund (RAGS): Process for Designing and Conducting Ecological Risk Assessments* (USEPA, 1997a)
- *Region 4 Ecological Risk Assessment Bulletins – Supplement to RAGS* (USEPA, 2001b)
- *Navy Guidance for Conducting Ecological Risk Assessments* (Department of the Navy [Navy], 2003)
- *NCDENR Guidelines for Performing Screening Level Ecological Risk Assessments within the North Carolina Division of Waste Management* (NCDENR, 2003).

7.2 Step 1—Preliminary Problem Formulation and Ecological Effects Evaluation

7.2.1 Problem Formulation

The problem formulation covers the physical layout of the site, its history and ecology, available analytical data, fate and transport mechanisms, complete exposure pathways, and receptors of concern.

Site Description

Site 49, also known as the Former MCAS Suspected Minor Dump Site, covers 1 acre near Longstaff Street at MCAS New River. According to the IAS, minor quantities of waste may have been disposed of at the site. A detailed description of the history of site use is included in Section 2.

A PA/SI was completed in March 2011 (CH2M HILL, 2011b). Potential ecological risks were identified from VOC-impacted groundwater discharging to the New River.

Ecological Setting

The New River is a coastal blackwater river. The New River watershed sits within Onslow County and includes the Base and the City of Jacksonville to the north.

The watershed upstream of Jacksonville is characterized by gum-cypress swamps, with upland areas used primarily for forestry and agriculture. At Jacksonville, the river widens into a broad, slow-moving tidal embayment. Approximately 16 miles south of Jacksonville, it discharges into the Atlantic Ocean through a narrow opening called New River Inlet. Jacksonville and the Base comprise the majority of land in the lower watershed (the area downstream of the United States 17 Bypass). There are 223 stream miles, 22,810 estuarine acres, and 15 miles of Atlantic coastline in this sub basin.

This portion of the North Carolina coast consists of sandy beaches, and the adjacent upland area transitions to a region of pines (*Pinus* sp.), scrub oaks (*Quercus* sp.), sweet gum (*Liquidambar styraciflua*), and dogwood (*Cornus* sp.). Wire grass (*Cynodon dactylon*) is the primary undergrowth species, and the area is interspersed with bottomland hardwood forests that are dominated by bald cypress (*Taxodium distichum*), swamp tupelo (*Nyssa sylvatica* var. *biflora*), and white cedar (*Chamaecyparis thyoides*). Croplands are common in this area, and consist of mostly corn, cotton, peanuts, and tobacco.

The climate in Jacksonville is characterized by short, mild winters and long, hot, humid summers. Average annual net precipitation is approximately 50 inches. Ambient air temperatures generally range from 33 to 53°F in the winter months, and 71 to 88°F during the summer months.

Site 49 encompasses approximately 1 acre of wooded and cleared land along the New River. Mowed lawn and bare disturbed ground covers the northwestern portion of the site. The southeastern portion of the site is a pine-hardwood mixed forest with thick undergrowth. Forested wetland and a small tidally-influenced stream are also present in the southern portion of the site (**Figure 3-1**). The upper portion of the stream is intermittent.

The ecological checklist in Appendix G identifies the terrestrial and aquatic habitats onsite and nearby. Threatened or endangered species located in Onslow County are not expected to occur at the site or in the adjacent areas (**Appendix G**, Table G-1).

Summary of Available Analytical Data

Soil, surface water, sediment, and porewater data used for this assessment were collected in 2011 from various areas of the site (**Figure 3-1**). Groundwater data were collected in 2009, 2010, and 2011. The following samples were used for the assessment:

- Thirteen surface soil samples (plus one field duplicate) from 0 to 1 ft bgs
- Six subsurface soil samples (plus one field duplicate) from 1 to 5 ft bgs
- Fifteen groundwater samples (plus two field duplicates)
- Two surface water samples (plus one field duplicate)
- Five sediment samples (plus one field duplicate)
- Three porewater samples (plus one field duplicate)

Samples are listed in **Appendix G**, Table G-2. All samples were analyzed for VOCs. Groundwater samples from July 2009 were also analyzed for SVOCs and metals.

Fate and Transport Mechanisms

Release and transport mechanisms at the site, as they relate to ecological exposures, are briefly discussed as follows.

Leaching to Groundwater

Several VOCs (19) and metals (11) (as presented in Section 4) were detected in groundwater samples. Concentrations were generally low. Site-related constituents in groundwater may migrate and impact aquatic habitat. Upwelling (venting) groundwater and the associated contaminants may discharge to surface water. Consequently, groundwater data are screened using marine screening levels assuming groundwater may discharge to the adjacent New River.

Surface Water Runoff and Erosion

The northwestern portion of the site and the area west of the site are developed, with mostly mowed grasses and bare, disturbed ground and a few paved areas. The runoff from these areas discharges to the wetlands and the small intermittent stream located in the southeastern portion of the site. In general, high rates of infiltration are expected across most of the unpaved areas, and erosion at the site is expected to be minimal.

Volatilization

This exposure pathway is expected to be insignificant. While burrowing may occur on the site, burrow depths are likely to be shallow given the type of receptors present. The pathway is not expected to be significant because VOC contamination was not elevated or widespread in surface soils or subsurface soils, and detected VOC concentrations were generally low.

Dust

Soil dust at the site is not expected to be significant because the majority of the site is covered by grass and trees.

Conceptual Site Model

Information regarding the general habitat features of Site 49 and the fate and transport of the chemicals associated with site media was used to build an ecological CSM. Key components of the CSM include chemical sources, release and transport mechanisms, exposure media, receptors, and exposure routes (**Appendix G**, Figure G-1).

Potentially complete and significant exposure pathways to semi-aquatic and terrestrial ecological receptors include the following:

- Direct exposure to plants (root uptake), benthic and soil invertebrates (dermal and direct ingestion), and aquatic biota (dermal and direct ingestion)
- Incidental ingestion and dermal exposure for wildlife
- Food chain (prey consumption) exposures for wildlife

Terrestrial bird and mammal species that are representative of Site 49 include the short-tailed shrew (mammalian insectivore), white-footed mouse (mammalian omnivore), red fox (mammalian omnivore), American robin (avian omnivore), Canada goose (avian herbivore), mourning dove (avian herbivore), and red-tailed hawk (avian carnivore). Selected semi-aquatic bird and mammal species include the raccoon (mammalian omnivore), muskrat (mammalian omnivore), and osprey (avian carnivore).

7.2.2 Ecological Effects Evaluation

The potential for effects from exposure to each medium was evaluated by comparing ecological screening values (ESVs) to maximum concentrations (Step 2) of constituents detected at the site. The assessment of sediment involved comparison of analyte concentrations to the Region 4 ESVs (USEPA, 2001a). For soil, the USEPA Ecological Soil Screening Levels (EcoSSLs) (USEPA, 2009d) were preferentially selected over Region 4 values (USEPA, 2001a). When no EcoSSL was available for a constituent, the Region 4 value was selected.

A selection hierarchy was also applied to groundwater, surface water, and porewater. Marine NRWQC (USEPA, 2009b) were preferentially selected over the marine Region 4 values. However, when no NRWQC was available for a constituent, the Region 4 value was selected as the ESV for that constituent.

7.3 Step 2—Preliminary Exposure Estimate and Risk Calculation

In Step 2, risk to ecological receptors was evaluated by calculating HQs. HQs are calculated by dividing the maximum concentration detected within a medium by the corresponding medium-specific ESV. Maximum concentrations for detected analytes and maximum detection limits for undetected analytes were used to conservatively estimate potential chemical exposures to ecological receptors. Risk estimates were calculated for surface soil, subsurface soil, groundwater, surface water, sediment, and porewater (**Appendix G**, Table G-3 through Table G-8).

North Carolina Screening-level Ecological Risk Assessment (SLERA) guidance (NCDENR, 2003) requires that constituents falling into one of the following categories be identified as a Step 2 COPC:

- Category 1 – Contaminants with a maximum detection exceeding the ESV
- Category 2 – Undetected contaminants with a laboratory sample quantitation limit (SQL) exceeding the ESV
- Category 3 – Detected contaminants with no ESV
- Category 4 – Undetected contaminants with no ESV

Results of the Step 2 screenings are summarized in **Appendix G**, Table G-9. Based on the results, 37 COPCs in surface soil, 31 COPCs in subsurface soil, 95 COPCs in groundwater, 26 COPCs in surface water, 48 COPCs in sediment, and 26 COPCs in porewater were carried forward to Step 3.

7.4 Step 3a—Refinement of Conservative Exposure Assumptions

Using the same CSM, Step 3a involves re-evaluation of the conservative assumptions used in Steps 1 and 2, resulting in a refinement of the COPC list. Step 3a includes a re-assessment of the risks to lower trophic level receptors (direct exposure) and an evaluation, for the subset of contaminants that are bioaccumulative, of the potential for risks to upper trophic level receptors (food chain transfer).

It should be noted that non-detected analytes that were identified as COPCs in Step 2 were not considered potential COPCs in Step 3a and are not discussed further. If the non-detected COPCs were present, the actual concentrations would be less than the maximum method detection limit, which was compared to the ESV in the Step 2 evaluation. Consequently, risks estimated based on comparison to the method detection limit are biased high, and non-detected constituents are considered unlikely to pose a significant risk to populations of site receptors. A discussion of the uncertainty associated with non-detect analytes is presented in the Uncertainty section (Section 7.5).

Inorganic macronutrients were also eliminated from further consideration. These include calcium, magnesium, potassium, and sodium. In addition, inorganics with maximum concentrations in the range of Base background (Baker, 2001) were eliminated from further consideration. In this PA/SI, the only medium with inorganic data was groundwater. The maximum concentrations of aluminum, barium, iron, manganese, and nickel in groundwater were within the background range. These inorganics and the inorganic macronutrients do not appear in the Step 3 groundwater table.

7.4.1 Direct Exposure

The risk to lower trophic level receptors was recalculated using a conservative estimate of the mean chemical concentration as the EPC. Conservative estimate of the mean EPCs were calculated using ProUCL Version 4.0.0.5 (USEPA, 2010). If a conservative estimate of the mean EPC could not be calculated, the arithmetic mean concentration was used as the EPC. The maximum detected concentration was retained as the EPC if the arithmetic mean was higher than the maximum.

Risks are further evaluated using a weight-of-evidence (WOE) approach not utilized in Step 2. The WOE approach considers the magnitude of the recalculated risks, toxicity information not used in the Step 2 screening, frequency of detection, magnitude of exceedance, and the distribution of detected concentrations. Detected constituents considered to be common laboratory contaminants (Department of Toxic Substance Control [DTSC], 2006) were eliminated from further consideration.

When ESVs were not available from the regulatory sources used in the Step 2 evaluation, a supplemental ESV from the literature was identified in Step 3. Risk uncertainties associated with constituents with no available supplemental ESVs are discussed in Section 1.5.

Appendix G, Tables G-10 through G-15, present the results of the direct exposure assessment for surface soil, subsurface soil, groundwater, surface water, sediment, and porewater, respectively. A summary of the screening results is presented as follows.

Surface Soil

Based on refined screening, TCE was the only surface soil constituent with an HQ greater than 1 (HQ = 4.7) (**Appendix G**, Table G-10). TCE was detected in only 2 of 13 samples, with a maximum concentration of 4.7 µg/kg. The USEPA Region 4 screening value (1 µg/kg) was obtained from the Netherlands Ministry of Housing, Spatial Planning, and Environment (MHSPE) (MHSPE, 1994, *cited in* Friday, 1998). A review of the Department of Energy's Risk Assessment Information System (RAIS) database of screening values (http://rais.ornl.gov/tools/eco_search.php) indicates that updated information from MHSPE is available. The database lists the current Netherlands target value, a concentration related to negligible risk for ecosystems, as 100 µg/kg. The database also lists the USEPA Region 5 screening value of 12,400 µg/kg. The maximum concentration of TCE at Site 49 is significantly less than the updated MHSPE value and the Region 5 value. As a result, TCE is not expected to pose a significant risk to populations of receptors at the site.

Subsurface Soil

Based on refined screening, none of the detected analytes were found to have HQs greater than 1 (**Appendix G**, Table G-11). Consequently, none of the constituents are expected to pose a significant risk to receptors.

Groundwater

Based on the refined screening, none of the detected analytes were found to have HQs greater than 1 (**Appendix G**, Table G-12) As a result, none of the constituents in groundwater are expected to pose risk to lower trophic receptors.

Surface Water

Since none of the constituents in surface water were detected (**Appendix G**, Table G-13), a significant risk to receptors is not expected to occur.

Sediment

Based on the refined screening, none of the detected analytes were found to have HQs greater than 1 (**Appendix G**, Table G-14). As a result, none of the constituents in sediment are expected to pose risk to lower trophic receptors.

Porewater

Based on the refined screening, none of the detected analytes were found to have HQs greater than 1 (**Appendix G**, Table G-15). As a result, none of the constituents in sediment are expected to pose risk to lower trophic receptors.

7.4.2 Food Chain Transfer

Food chain modeling is conducted for detected constituents carried to Step 3 and identified as bioaccumulative (USEPA, 2000b). For this PA/SI, there were no constituents that fit these criteria. As a result, food chain modeling was not necessary.

7.5 Uncertainty

Uncertainties are inherent in all risk assessments. In general, risks are over-estimated in this evaluation through the use of conservative exposure, effects, and risk characterization assumptions described in the previous sections. A qualitative evaluation of the major general uncertainties associated with this assessment is presented as follows.

Effects Assessment Uncertainties

Undetected chemicals for which no toxicological data were available were identified as posing no risk. Although some uncertainty is associated with this approach, it was assumed that if chemicals were present at ecologically relevant levels, they would be detected in some samples. Additionally, those analytes that were detected but lacked toxicological data were also identified as posing no risk, though they were considered an uncertainty. A lack of toxicological data demonstrates that these chemicals historically have not been identified as significant ecological risk drivers, and it is unlikely these chemicals pose an ecological risk.

Standard industry laboratory methods of analysis were used for the development of detection limits. In some instances, the methods produced detection limits that were higher than the ESVs. This is considered an acceptable uncertainty. Because these chemicals were not detected, they are not known to be present onsite, but the potential for risks cannot be totally discounted because the reporting limits for at least some samples are higher than the screening values.

Exposure Assessment Uncertainties

The exposure estimates in this assessment assume that 100 percent of the chemical concentrations to which receptors are exposed are in the bioavailable form. However, most chemicals will not be 100 percent bioavailable. In cases where bioavailability is less than 100 percent, risk is over-estimated.

Analytical chemistry data collected within the exposure area at Site 49 were assumed to adequately represent the exposure to ecological receptors, and exposure concentrations were assumed to represent the distribution of constituents present. However, because of the heterogeneous nature of waste, concentrations may be lower or higher in areas that were not sampled. These assumptions could either under- or over-estimate risk.

7.6 Conclusions

No constituents in site media that are expected to a cause a significant risk to populations of ecological receptors at Site 49 were identified.

SECTION 8

Remedial Action Objectives and Identification and Screening of Technologies

Based on the results of the RI, VOCs were detected in groundwater above regulatory screening criteria. Potential unacceptable risks were identified from future residential exposure to VOCs in groundwater and future exposure through a potential VI pathway, if buildings are constructed onsite within 100 ft of the impacted groundwater.

This section describes the initial steps to evaluate and develop remedial alternatives for addressing potential risks from VOCs in groundwater at Site 49, which include the development of RAOs, identification of the remediation target area, presentation of ARARs, identification of General Response Actions (GRAs), and initial identification and screening of potential technologies.

8.1 Remedial Action Objectives

RAOs consist of medium-specific goals for protecting human health and the environment. Only COCs identified in the HHRA that exceeded the NCGWQS or MCLs during this investigation are retained and carried forward through the FS. The RAOs for the remediation of groundwater at Site 49 are based upon the potential presence of future residential receptors and the potential that groundwater at Site 49 may be used for potable purposes in the future and include the following:

1. Restore groundwater quality to meet NCDENR and federal primary drinking water standards, based on the classification of the aquifer as a potential source of drinking water (Class GA or Class GSA) under 15A NCAC 02L.0201.
2. Prevent exposure to COCs in groundwater and VI from COCs in groundwater until such time as groundwater concentrations or VI mitigation measures allow for Unlimited Use/Unrestricted Exposure.

The proposed clean up goals for Site 49 are provided as follows:

Chemical	NCGWQS/MCL* (µg/L)
1,1,2,2-PCA	0.2
PCE	0.7
TCE	3
VC	0.03
Benzene	1
1,2-DCA	0.4
cis-1,2 DCE	70*
trans-1,2 DCE	100*
1,1,2-TCA	5*

Note:

Clean up level based on most conservative values between the NCGWQS and MCL

8.2 Remediation Target Area

The remediation target area is based on groundwater VOC concentrations detected above the cleanup levels (**Figure 8-1**). The area is approximately 1,900 ft^2 and the vertical extent is confined to the surficial aquifer, estimated at 25 ft bgs. The area of concern for a potential future VI pathway is within a 100-ft radius of shallow groundwater exceedances of the cleanup goals.

8.3 Applicable or Relevant and Appropriate Regulations

Certain regulatory requirements and standards are also referred to as ARARs. There are three types of ARARs: chemical-specific, action-specific, and location-specific, which are described in further detail as follows. CERCLA Section 121(d) specifies in part that remedial actions for cleanup of hazardous substances must comply with requirements and standards under federal or more stringent state environmental laws and regulations that are applicable or relevant and appropriate (that is, ARARs) to the hazardous substances or particular circumstances at a site or obtain a waiver (see also 40 Code of Federal Regulations [CFR] 300.430[f][1][ii][B]). ARARs include only federal and state environmental or facility siting laws and regulations and do not include occupational safety or worker protection requirements. In addition, in accordance with 40 CFR 300.405(g)(3), other advisories, criteria, or guidance may be considered in developing remedies (the so-called To-Be-Considered guidance category). Under CERCLA 121(e)(1), permits are not required for response actions conducted entirely onsite. In addition, response actions must comply with the "substantive," as opposed to "administrative," requirements of any of the identified ARARs.

8.3.1 Chemical-specific ARARs

Chemical-specific ARARs provide health-based concentration or RBC limits or discharge limitations in various environmental media (surface water and groundwater) for specific hazardous substances, pollutants, or contaminants; they are listed in **Table 8-1**. Remediation levels for most of the COCs in groundwater will be based on relevant and appropriate drinking water standards, including NCGWQS or federal MCLs.

8.3.2 Action-specific ARARs

Action-specific ARARs are usually technology-based or activity-based requirements that define acceptable treatment and disposal procedures for hazardous substances. The action-specific ARARs for Site 49 are summarized in **Table 8-2**.

8.3.3 Location-specific ARARs

Location-specific ARARs restrict remedial activities and media concentrations based on characteristics of surrounding environments. Location-specific ARARs may include restrictions on remedial actions within wetlands or floodplains, near locations of archeological and natural resources, near historical landmarks, near locations of known endangered species, or on protected waterways.

The site is located in the Atlantic Migratory Flyway. If migratory birds, or their nests or eggs are identified at the site, operations will not destroy the birds, nests, or eggs.

Activities at Site 49 that will affect North Carolina's coastal zone will be consistent to the maximum extent practicable with North Carolina's enforceable policies. Activities performed onsite and in compliance with CERCLA are not subject to administrative review; however, the substantive requirements of making a consistency determination will be met.

An evaluation of location-specific ARARs for Site 49 is summarized in **Table 8-3**.

8.4 General Response Actions

GRAs describe general remedial activities that may satisfy RAOs, either independently or in combination. GRAs to be considered for satisfying RAOs for the remediation of Site 49 are no action, institutional controls (ICs), monitoring, containment, removal, treatment, and disposal. **Table 8-4** summarizes how each GRA would achieve RAOs.

TABLE 8-1

Chemical-Specific ARARs

Site 49 Remedial Investigation/Feasibility Study

MCIEAST-MCB CAMLEJ, North Carolina

Federal and North Carolina Chemical-Specific ARARs			
Media	**Requirement**	**Prerequisite**	**Citation**
Classification of contaminated groundwater	Groundwaters in the state naturally containing 250 mg/L or less chloride *are classified as GA (existing or potential source of drinking water supply for humans*) under 15A NCAC 02L .0201(1)	Groundwaters located within the boundaries or under the extraterritorial jurisdiction of the State of North Carolina - **Applicable**	15A NCAC 02L .0302(1)
	Groundwaters in the state naturally containing greater than 250 mg/L of chloride *are classified as GSA* under 15A NCAC 02L .0201(2)		15A NCAC 02L .0302(2)
Groundwater	Establishes maximum contaminant concentrations for groundwater. The following remedial goals have been set using this criteria. · 1,1,2,2 - PCA (0.2 µg/L) · PCE (0.7 µg/L) · TCE (3 µg/L) · Vinyl Chloride (0.03 µg/L) · Benzene (1 µg/L)	Class GA or GSA groundwaters with contaminant(s) concentrations exceeding standards listed in 15A NCAC 02L .0202 - **Applicable to alternatives 1, 2, 3, and 4**	15A NCAC 02L .0202(a), (b), and (g)(9), (131), (132), (139), (145), and Appendix 1
	Shall not exceed the Safe Drinking Water Act National Revised Primary Drinking Water Regulations: maximum contaminant levels (MCLs) for organic contaminants specified in 40 CFR 141.61(a). · 1,1,2,-TCA (5 µg/L) · cis 1,2-DCE (70 µg/L) · trans 1,2,-DCE (100 µg/L)	Groundwaters classified as GA or GSA which are an existing or potential source of drinking water **- Relevant and Appropriate to alternatives 1, 2, 3, and 4**	40 CFR 141.61(a)(9), (17), and (21)

TABLE 8-2

Potential Action-Specific ARARs

Site 49 Remedial Investigation/Feasibility Study

MCIEAST-MCB CAMLEJ, North Carolina

Federal and North Carolina Action-Specific ARARs			
Action	**Requirement**	**Prerequisite**	**Citation**
General Construction Standards — All Land-disturbing Activities (i.e., excavation, clearing, grading, etc.)			
Monitoring Well Installation, Operation, and Abandonment			
Construction of groundwater monitoring well(s)	No well shall be located, constructed, operated, or repaired in any manner that may adversely impact the quality of groundwater. Must comply with general requirements for the location and construction of wells not intended for water supply	Installation of wells (including temporary) other than for water supply - **Applicable to alternatives 2, 3, and 4**	15A NCAC 02C .0108(a), (c) - (p), and (s)
Implementation of groundwater monitoring system	Shall be constructed in a manner that will not result in contamination of adjacent groundwaters of a higher quality.	Installation of monitoring system to evaluate effects of any actions taken to restore groundwater quality, as well as the efficacy of treatment **- Applicable to alternatives 2, 3, and 4**	15A NCAC 02L .0110 (b)
Maintenance of groundwater monitoring well(s)	Every well shall be maintained by the owner in a condition whereby it will conserve and protect groundwater resources, and whereby it will not be a source or channel of contamination or pollution to the water supply or any aquifer.	Installation of wells (including temporary wells) other than for water supply **- Applicable to alternatives 2, 3, and 4**	15A NCAC 02C .0112(a)
	Broken, punctured, or otherwise defective or unserviceable casing, screens, fixtures, seals, or any part of the well head shall be repaired or replaced, or the well shall be abandoned pursuant to 15A NCAC 02C .0113		15A NCAC 02C .0112(d)
	All materials used in the maintenance, replacement, or repair of any well shall meet the requirements for new installation.		15A NCAC 02C .0112(c)
Abandonment of groundwater monitoring well(s)	Shall be abandoned in accordance with the requirements of 15A NCAC 02C .0113(d)	Permanent abandonment of wells (including temporary wells) other than for water supply **- Applicable to alternatives 2, 3, and 4**	15A NCAC 02C .0113(d)
Underground Injection Well Installation, Operation, and Abandonment			
Construction of injection well(s) for *in-situ* treatment of groundwater	Construction, use or operation may be allowed provided the injected material does not contain any waste or any substance of a composition and concentration such that, if it were discharged to the land or waters of the state, would create a threat to human health or would otherwise render those waters unsuitable for their intended usage.	Installation of Class 5 underground injection well (Type 5I – In-situ Groundwater Remediation Well and Type 5P - Air Injection Well) **- Applicable to alternatives 3 and 4**	15A NCAC 02C .0209(e)(3)
Location of injection well(s) for *in-situ* treatment of groundwater	Shall not be located in an area generally subject to flooding. Areas which are generally subject to flooding include those with concave slope, alluvial or colluvial soils, gullies, depressions, and drainage ways.	Installation of Class 5 underground injection well (Type I – In-situ Groundwater Remediation Well and Type P - Air Injection Well) **- Applicable to alternatives 3 and 4**	15A NCAC 02C .0213(a)(1)
	Shall not be located at a point where the injectant would degrade the existing quality of the groundwater in the water-bearing unit into which the injectant is being released.	Installation of Class 5 underground injection well (Type I – In-situ Groundwater Remediation Well) where the concentration of any component of the injectant *exceeds* the groundwater quality standards specified in 15A NCAC 2L .0202 **- Applicable to alternatives 3 and 4**	15A NCAC 02C .0213(a)(2)(A)(i)
	Shall not be located at a point where the injectant would result in a contravention of any of the aforementioned groundwater quality standards in the water-bearing unit into which the injectant is being released.	Installation of Class 5 underground injection well (Type I – In-situ Groundwater Remediation Well) where the concentration of any component of the injectant *is less than* the groundwater quality standards specified in 15A NCAC 2L .0202 **- Applicable to alternatives 3 and 4**	15A NCAC 02C .0213(a)(2)(B)

TABLE 8-2

Potential Action-Specific ARARs

Site 49 Remedial Investigation/Feasibility Study

MCIEAST-MCB CAMLEJ, North Carolina

Federal and North Carolina Action-Specific ARARs			
Action	**Requirement**	**Prerequisite**	**Citation**
Construction of injection well(s) for *in-situ* treatment of groundwater	Shall follow the procedures, methods, specified materials, and requirements specified in this Rule for Drilling, Casing, Screens and Testing.	Installation of Class 5 underground injection well (Type 5I – In-situ Groundwater Remediation Well and Type 5P - Air Injection Well) - **Applicable to alternatives 3 and 4**	15A NCAC 02C .0213(c)(1), (3), (4)
	Shall follow the additional procedures and methods specified for Type 5I wells	Installation of Class 5 underground injection well (Type 5I – In-situ Groundwater Remediation Well) **- Applicable to alternatives 3 and 4**	15A NCAC 02C .0213(c)(2)
	Shall follow the procedures, methods, specified materials, and requirements specified in the paragraphs (1) through (8) of this Rule for Grouting and Sand-and-Gravel Packing.	Installation of Class 5 underground injection well (Type 5I – In-situ Groundwater Remediation Well and Type 5P - Air Injection Well) **- Applicable to alternatives 3 and 4**	15A NCAC 02C .0213(d)
Operating an injection well(s) for *in-situ* treatment of groundwater	Pressure at the well head shall be limited to a maximum which will ensure the pressure in the injection zone does not initiate new fractures or propagate existing fractures in the injection zone, initiate fractures in the confining zone, or cause the migration of injected or formation fluids outside the injection zone or area.		15A NCAC 02C .0213(e)(1)
Abandonment of injection well(s) for *in-situ* treatment of groundwater	Shall be abandoned in accordance with the requirements of subparagraphs (1) and (2) of 15A NCAC 02C .0214(a).	Installation of Class 5 underground injection well (Type I – In-situ Groundwater Remediation Well *or* Type P Air Injection Well), including exploratory or test wells **- Applicable to alternatives 3 and 4**	15A NCAC 02C .0214(a)
Control of Diffuse VOC Emissions from Groundwater Treatment			
Emissions of VOCs from groundwater treatment (e.g., sparging system)	Shall not emit any of the toxic air pollutants listed in the table of the Rule in such quantities that may cause or contribute beyond the premises (adjacent property boundary) to any significant ambient air concentration that may adversely affect human health.	Emissions of toxic air pollutants (e.g., VOCs) from facility into the ambient air **- Applicable to alternatives 3 and 4**	15A NCAC 02D .1104
	Shall install and operate reasonable available control technology to limit emissions of VOCs.	Air emissions of VOCs from facilities where there is no other applicable emissions control rule **- Relevant and Appropriate to alternatives 3 and 4**	15A NCAC 02D .0951(c)
	One of the applicable test methods in Appendix M in 40 CFR part 51 or Appendix A in 40 CFR Part 60 shall be used to determine compliance with VOC emission standards.	VOC emission source not covered by 15A NCAC 02D.2613(b) through (e) **- Relevant and Appropriate to alternatives 3 and 4**	15A NCAC 02D .2613(g)
Waste Characterization and Storage — Primary Wastes (i.e., excavated contaminated soils)			
Storage of solid waste	All solid waste shall be stored in such a manner as to prevent the creation of a nuisance, insanitary conditions, or a potential public health hazard.	Generation of solid waste which is determined *not* to be hazardous - **Relevant and Appropriate to alternatives 2, 3, and 4**	15A NCAC 13B .0104(f)
	Containers for the storage of solid waste shall be maintained in such a manner as to prevent the creation of a nuisance or insanitary conditions. Containers that are broken or that otherwise fail to meet this Rule shall be replaced with acceptable containers.		15A NCAC 13B .0104(e)
Temporary storage of hazardous waste in containers	A generator may accumulate hazardous waste at the facility for up to 90 days provided that:	Accumulation of RCRA hazardous waste on site as defined in 40 CFR 260.10 **- Applicable to alternatives 2, 3, and 4**	15A NCAC 13A.0107(c) only as it incorporates the following citations:
	· waste is placed in containers that comply with 40 CFR 265.171-173; and		40 CFR 262.34(a)(1)(i)
	· the date upon which accumulation begins is clearly marked and visible for inspection on each container		40 CFR 262.34(a)(2)
	· container is marked with the words "hazardous waste"; or		40 CFR 264.34(a)(3)

TABLE 8-3

Potential Location-Specific ARARs

Site 49 Remedial Investigation/Feasibility Study

MCIEAST-MCB CAMLEJ, North Carolina

Federal and North Carolina Location-Specific ARARs			
Location	**Requirement**	**Prerequisite**	**Citation**
Presence of wetlands	Standards shall be used to assure the maintenance or enhancement of the existing wetland uses.	Activities within, wetlands as defined by G.S. 143-212(6) – **Applicable to alternatives 2, 3, and 4**	15A NCAC 02B.0231(b)(1)-(4)
	No discharge of dredged or fill material will be allowed unless appropriate and practicable steps are taken that minimize potential adverse impacts of the discharge on the aquatic ecosystem.	Discharges of dredged or fill material to surface waters, including wetlands. - **Applicable to alternatives 3 and 4**	40 CFR 230.10(d); 33 CFR 320.4(a), (b), (d), (p), (r)
Migratory bird area	Protects almost all species of native birds in the United States from unregulated taking.	Presence of migratory birds — **Applicable for alternatives 2, 3, and 4**	*Migratory Bird Treaty Act* , 16 USC 703
Coastal zone or area that will affect the coastal zone	Federal activities must be consistent with, to the area that will affect maximum extent practicable, State coastal zone management programs. Federal agencies must supply the State with a consistency determination.	Actions that may affect identified coastal zone resources or uses — **Applicable for alternatives 2, 3, and 4**	15 CFR 930.33(a)(1), (a)(2), (b); .35(a), (b); .36(a)

TABLE 8-4

General Response Actions

Site 49 Remedial Investigation/Feasibility Study

MCIEAST-MCB CAMLEJ, North Carolina

General Response Action	Remedial Goals Met
No Action	None. Serves as a baseline to compare other response actions.
Institutional Controls	Prevents human exposure to groundwater by placing restrictions on aquifer use and activities that may result in exposure.
Monitoring	Relies on natural attenuation to reduce contaminant concentrations without performing any other measures.
Containment	Minimizes or prevents the migration of contaminants in the groundwater to receptors.
Removal	Removes contaminants from the saturated zone by physical extraction of groundwater and/or removal of impacted saturated soil.
Treatment	Reduces the mobility, toxicity, or volume of contaminated groundwater.
Disposal	Minimizes the likelihood of exposure to contaminants by extracting them from groundwater and placing them in a controlled environment.

Legend
- Pore Water Sample Location
- Monitoring Well Locations
- Approximate Location of Terra Cotta Pipe
- Drainage Feature
- Extent of COCs Exceeding NCGWQS
- Buildings
- Jurisdictional Wetlands
- Site Boundary

Notes:
-Contours have been interpolated between well locations. Actual conditions may differ from those shown on this figure
-Only exceedances of one or more comparison criteria are shown

Figure 8-1
Proposed Treatment Area
Site 49 Remedial Investigation/Feasibility Study
MCIEAST-MCB CAMLEJ
North Carolina

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SECTION 9

Development and Screening of Alternatives

In this section, the technologies identified for further analysis are developed into remedial alternatives.

Section 121(b) of CERCLA identifies the following statutory preferences when developing and evaluating remedial alternatives:

- Remedial actions involving treatment that permanently and significantly reduce the toxicity, mobility, and volume of the COCs are preferred.
- Offsite transport and disposal of COCs without treatment is considered the least favorable remedial action when practical treatment technologies are available.
- Remedial actions that use permanent solutions, alternative treatment technologies, or resource recovery technologies are to be assessed.

9.1 Development of Remedial Alternatives

Remedial alternatives were developed by combining the technologies retained following the screening process presented in **Table 9-1**. To avoid evaluating an unmanageable number of alternatives, only the most logistically and technically sensible combinations for the given site conditions are carried forward. Four remedial alternative combinations were developed, providing a range of less- to more-aggressive technologies. All alternatives, with the exception of No Action, meet Site 49 RAOs. The alternatives are as follows:

- Alternative 1 - No Action
- Alternative 2 – Monitored Natural Attenuation (MNA) and Land use controls (LUCs)
- Alternative 3 – Enhanced *in situ* Bioremediation (EISB) with LUCs and LTM
- Alternative 4 – Air Sparging (AS) with LUCs, and LTM

LUCs prohibiting potable use of the aquifer and requiring evaluation of the shallow groundwater for VI potential prior to construction of any new buildings planned within 100 feet of the groundwater plume will be considered a part of Alternatives 2, 3, and 4. The following measures will be implemented as part of the LUCs: 1) Notice of Inactive Hazardous Substance or Waste Disposal; 2) a Notice of Contaminated Site with the Register of Deeds of Onslow County; and 3) LUCs incorporated into the Base Master Plan.

The remedial alternatives developed in the following subsections are intended to be conceptual. Assumptions are provided for each of the alternatives for the purpose of evaluation. However, actual details would be developed during the Remedial Design (RD) phase and may vary.

9.1.1 Alternative 1 – No Action

Alternative 1 is the No Action alternative. Alternative 1 does not include any LUCs, groundwater monitoring, or active remedial activities to minimize risk to public health or environment. Alternative 1 is required as a baseline for a comparison of alternatives.

9.1.2 Alternative 2 – MNA and LUCs

Alternative 2 includes LUCs and groundwater monitoring.

Under Alternative 2, the site would be designated as a “restricted use” area in the Base geographic information system (GIS). This designation would place controls on residential development and groundwater use. LUCs would also include future evaluation of the VI pathway if a building were constructed at the site and regularly occupied. A LUC RD would be developed to specify the implementation and maintenance actions. Records of the groundwater contamination would be kept in the Base GIS and environmental database. The restricted-use designation would remain in place until groundwater monitoring indicates that cleanup levels have been met. The proposed LUC boundary is depicted on **Figure 9-1**.

Although geochemical conditions do not appear favorable for biological degradation (Section 5), the COC concentrations in porewater samples collected in the New River were below the respective NCSWQS, indicating that COCs in groundwater are not impacting the New River at the current concentrations. Sampling will be conducted to monitor the concentrations of COCs in groundwater until cleanup levels have been met.

The primary natural attenuation mechanism at Site 49 is advection and dilution when the groundwater discharges to the New River. Based on the distance of VOC-impacted groundwater (approximately 45 ft) from the New River and predicted contaminant migration values from **Table 5-3**, VOCs in the surficial aquifer will reach cleanup levels in approximately 30 years. For cost estimating purposes, 30 years of LUCs and monitoring was assumed with 5-year reviews to reassess the protectiveness of the remedy.

The following assumptions were made to support the cost estimate for this alternative:

- MNA includes groundwater sampling from four existing monitoring wells (**Figure 9-1**) for analysis of COCs (1,1,2,2-PCA, PCE, TCE, VC, benzene, 1,2-DCA, *cis*-1,2-DCE, trans-1,2-DCE, and 1,1,2-TCA)
- Sampling will occur every 2 years for 30 years, and monitoring reports will be submitted to the Base, Navy, USEPA, and NCDENR to document site conditions
- LUCs will be implemented and maintained
- 5-year reviews will be completed to assess the protectiveness of the remedy

The monitoring assumptions, including frequency, duration, and analytical parameters, are included in the cost estimates (**Appendix H**).

9.1.3 Alternative 3 – EISB with LUCs and LTM

Alternative 3 includes EISB, performance monitoring, and LUCs. As discussed in Section 5, the primary COCs can be biodegraded anaerobically. EISB of COCs can be implemented via biostimulation and bioaugmentation. Biostimulation involves adding a suitable carbon substrate (soluble or insoluble, also known as slow-releasing) to the subsurface. The substrate depletes competing electron acceptors to create deep reducing conditions and provides an electron donor source for biodegradation processes. The substrate may also include nutrients such as yeast extract and vitamin B_{12}, which are desirable for growth of the dechlorinating bacteria. Bioaugmentation is conducted using a microbial culture, usually containing DHC, to “jump start” the biodegradation process and facilitate complete dechlorination. The effectiveness of EISB is dependent on successful injection of this food source into the subsurface, the presence of dechlorinating microbes at the site, and favorable hydrogeologic conditions. For the purpose of this FS conceptual design and cost estimate, lactate is selected as the substrate for the EISB process.

EISB with bioaugmentation can significantly increase the biodegradation rate of all the primary COCs, and cleanup levels for all COCs may be met in less than one year. However, source zones typically contain mass in lower permeability areas of the formation (absorbed on soil matrix). The VOC mass adsorbed on the soil matrix may degrade more slowly than that in dissolved phase. Furthermore, the dissolution and diffusion rate of mass out of the soil matrix into the dissolved phase may control the timeframe for cleaning up the plume. For cost estimating purposes, it is assumed that the diffusion process will extend the timeframe to 5 years to achieve the cleanup levels at this site.

As described in Section 2.5.2, there are two distinct lithologies (clay and silty sand) within the surficial aquifer. Each lithology will be treated separately with two delivery methods. To treat VOCs in the clay portion of the surficial aquifer, a DPT drilling rig with injection equipment will be used to advance 40 injection points evenly spaced on 4 ft centers to approximately 10 feet bgs (**Figure 9-2**). The estimated radius of influence (ROI) of substrate injection is approximately 2 ft. Assuming one pore volume of injection into each well and an effective porosity of 0.10, a total of approximately 500 cubic ft (3,800 gallons) of substrate solution will be injected (94 gallons per well). Assuming a target lactate concentration of 1,000 mg/L, approximately 56 pounds of 60 percent sodium lactate solution will be used to prepare the injectant. Although lactate is a dissolved substrate, the initial injection may maintain suitable geochemical conditions for biodegradation for approximately 3 to 6 months.

To treat the surficial aquifer below the clay layer, a network of 6 permanent injection wells will be installed in two rows, perpendicular to groundwater flow (**Figure 9-2**). The estimated radius of influence (ROI) of substrate injection is 7.5 ft. Injection wells will be installed with a screened interval of approximately 8 to 23 ft bgs. Delivery via permanently installed injection wells increases the ease with which future injections can be conducted. Although the spacing between the two rows screened layer is greater than 15 ft, drift of the substrate when groundwater flows through the barriers may extend the length of the impacted zone so that the entire area between the two rows will be covered.

Assuming one pore volume of injection into the each well and an effective porosity of 0.20, a total of approximately 3,180 cubic feet (ft^3) (24,000 gallons) of substrate solution will be injected (3,965 gallons per well). Assuming a target lactate concentration of 1,000 mg/L, approximately 340 pounds of 60 percent sodium lactate solution will be used to prepare the injectant. Although lactate is a dissolved substrate, the initial injection may maintain suitable geochemical conditions for biodegradation for approximately 3 to 6 months. One re-injection would occur 6 months after the initial injection.

Additional assumptions include:

- Injections will occur in three wells simultaneously at a rate of 2 gallons per minute (gpm) per well.
- Because of the absence of naturally occurring biological populations (discussed in Section 5), approximately 0.5 liter of bioaugmentation culture (with cell density greater than or equal to 10^{11} cells per milliliter [mL]) would be required into each permanent well during the initial injection event.
- Injection of a pH buffer (sodium bicarbonate) is required to maintain favorable conditions in the aquifer (between 6 and 8 SU).
- Baseline sampling will occur before injection activities, quarterly performance monitoring will occur during year 1, and annual monitoring will occur during years 2 through 5.
- Groundwater samples will be collected from four existing monitoring wells and analyzed for COCs and degradation products. Volatile fatty acid (VFA) and microbial analysis will be conducted semi-annually during the first year.
- LUCs will be maintained as described in Section 9.1.2 until RAOs have been achieved, estimated at 5 years.
- A 5-year review will be completed to review the protectiveness of this remedy.

The design and monitoring assumptions, including frequency, duration, and analytical parameters, are included in the cost estimates (**Appendix H**).

9.1.4 Alternative 4 – Air Sparging with LUCs and LTM

AS is an *in situ* technology whereby compressed air is injected into the saturated zone below the lowest depth of observed contamination in order to induce mass transfer (stripping) of VOCs from groundwater (primary mechanism) and aerobic biological degradation (secondary mechanism). Two-phase gas-flow in saturated porous media, driven by buoyancy, occurs as a complex and non-uniform series of finger-like channels with paths that are strongly influenced by subsurface heterogeneity.

A baseline monitoring event would be conducted prior to initiation of AS. Baseline sampling represents a critical step in an AS process. For several of the parameters, it is important to collect data prior to any AS activity to ensure that initial conditions are understood and documented. In particular, those parameters include water level elevation and groundwater quality (DO and VOCs). In order to monitor the potential VI issue for the adjacent building (AS810), soil vapor in the two proposed vapor monitoring points (VMPs) near the building will be sampled for VOCs. Soil vapor extraction (SVE) is not included in this design because groundwater concentrations are low, the plume is in an open field (risk of fugitive vapor migration is low), and the water table is too high for an SVE system to function effectively. Among the primary COCs at this site, 1,1,2,2-PCA is the most difficult to remove by air stripping because it is significantly less volatile than the others (with a K_h one to two orders of magnitude lower than those of the others), combined with the stringent NCGWQS of 0.2 μg/L.

Based on a conceptual design of one row of three wells, reducing the concentration of 1,1,2,2-PCA from 1 to 0.2 µg/L requires an air-flow rate of approximately 10 cubic feet per minute (cfm) per well, assuming 25 percent transfer efficiency, where 25 percent of the saturated zone is contacted by air channels (see **Appendix I** for this calculation). Nine injection wells (as depicted on **Figure 9-3**) screened from 25 to 28 ft bgs, with an air injection rate of 15 cfm per well, were used for conceptual design and cost estimation purposes.

Additional assumptions include:

- The air sparge system will be operated for 3 years in a pulsed mode (4 hours per row per day), which improves air contact with groundwater and reduces electrical costs (Batelle, 2002; NAVFAC, 2001).
- Baseline sampling will occur before the system is turned on, semi-annual performance monitoring will occur during years 1 through 3, and annual monitoring after system shut-down will occur from years 4 through 10.
- Monthly operations and maintenance (O&M) and quarterly heavy maintenance will occur while the system is operating.
- Four existing groundwater monitoring wells will be sampled for select VOCs and DO.
- LUCs will be maintained as described in Section 9.1.2 until RAOs have been achieved, estimated to be 10 years.
- Five-year reviews will be completed to review the protectiveness of this remedy.

The design and monitoring assumptions, including frequency, duration, and analytical parameters, are included in the cost estimates (**Appendix H**).

TABLE 9-1

Initial Screening of Remedial Technologies and Process Options

Site 49 Remedial Investigation/Feasibility Study

MCIEAST-MCB CAMLEJ, North Carolina

General Response Actions	Remedial Technology Types	Process Options	Descriptions	Comments	Retain for Further Evaluation
No Action	None	None	No further actions to address contaminated groundwater.	Baseline for CERCLA process.	Yes
Institutional Controls	Access and Use Restrictions	Land Use Controls	Land Use Controls issued for property within potentially contaminated areas to restrict property use and well installation.	Protect human health receptors given proper enforcement.	Yes
		Fences	Security fences installed around potentially contaminated areas to limit access.	Enforcement approach to prevent access to the site as part of land use controls.	Yes
Monitoring	Monitoring	Monitoring	Periodical monitoring and data evaluation to assess effectiveness of natural and/or active treatment processes. Monitoring is necessary to demonstrate that contaminant concentrations and/or mass continue to decrease and verify that potentially toxic transformation products are not created at levels that are a threat to human health or the environment.	Necessary component for natural attenuation and any active remedial alternatives.	Yes
Containment	Groundwater Containment	Physical Barriers	Slurry wall, sheet piling, vibrating barrier wall, etc. Physical and/or chemical wall that prevents contaminated groundwater from flowing either horizontally or vertically.	Containment of the plume will not achieve RAO, i.e., restore groundwater quality.	No
		Bio-Chemical Treatment (funnel + gate layout)	Low permeability walls (funnels) are constructed on the outside of the source or plume to contain and direct contaminated groundwater through a permeable *in situ* treatment system (gate). Treatment can be chemical (e.g., ZVI barrier) or biological (e.g., mulch bio-barrier). Walls are usually constructed of bentonite slurry or sheet piling.	The target treatment area at ths site is small enough so that a funel + gate layout is unncecessarily complicated.	No
		Pump and Treat	Groundwater is extracted and treated in an ex-situ treatment system. System can be designed to alter the natural hydraulic gradient to prevent contaminated groundwater flow either horizontally or vertically.	Contaminant concentrations are low and hydraulic barriers would not be a cost effective technology for the site.	No
Treatment	Removal	Excavation	Groundwater dewatering and excavation of impacted soils.	Not practical and cost effective for low concentration plume. Need off site disposal.	No
		Dual-Phase Extraction	A groundwater collection system is used to lower the water table to expose contaminated soil. Soil vapor extraction is then used to removed absorbed or trapped contaminants. Used for NAPL source zones.	Mobile NAPL is not present at this site.	No
	In Situ Biological Treatment	Aerobic Cometabolic Bioremediation	Injection of substrate containing inducers and electron acceptors (oxygen) to enhance aerobic biodegradation. Inducers serve as carbon sources that activate aerobic enzyme systems known to degrade chlorinated VOCs (fortuitous cometabolism).	Aerobic cometabolic bioremediation is not favorable for treatment of PCA and TCE. Not valid as an independent remedy. However, it may play a tole in air sparging alternative.	No
		Anaerobic Bioremediation (Enhanced Bioremediation)	Subsurface delivery of electron donors, nutrients, pH bufferign agent, etc., and bioaugmentation culture if needed, within the target zone to stimulate anaerobic biodegradation of chlorinated compounds.	Applicable for the COCs at this site; demonstrated effectiveness; usually more cost effective and environment friendly compared to other major *in situ* remediation technologies.	Yes
		Phytoremediation	Use of plants and their associated rhizospheric microorganisms to remove, degrade, or contain chemical contaminants in groundwater.	Only application for shallow aquifer. A general rule of thumb is that trees will not access deeper than 5 feet into the saturated zone. So, not an effective remedy for the entire contaiminated saturated zone (8 to 20 ft bgs)	No
	In Situ Physical, Chemical Treatment	Pneumatic Fracturing	A gas is injected into the subsurface at pressures exceeding the natural *in situ* pressures present in the soil / rock interface (i.e. overburden pressure, cohesive stresses, etc.) and at flow volumes exceeding the natural permeability of the subsurface.	Pneumatic Fracturing is more practical below 10 ft bgs, but the fractures created in the 10-18 ft bgs clay layer in the saturated zone may seal by themselves, then lose the benefit; the additional cost may not be justified by its questional benefits.	No
		Permeable Reactive Barrier (PRB)	Trench downgradient of contaminated area filled with permeable materials, such as ZVI or mulch/compost with a sand/gravel “binder” material. Groundwater is treated as it moves through the barrier by natural gradient.	Grid/areal treatment is more desired and feasible because of the relatively small size of the plume.	No
		Soil Mixing	Impacted soil column is homogenized using large diameter augers or other mechanical devices such as the Lang Tool. Chemical oxidation reagents, reduction reagents, or biological substrates are typically mixed with the soil. Effective for treatment of low permeability/heterogeneous materials.	Not applicable for this site because groundwater remediation is the focus, not the soil.	No
		Air Sparging	Air is injected into saturated matrices to remove contaminants mainly through volatilization, aerobic biodegradaton may play a minor role.	Air sparging of chlorinated solvents is used to promote mass removal, primarily via mass transfer (“stripping”). Effectiveness decreases in low permeability or heterogeneous materials because of low air channel density and/or “bypassing” of dense soils. Silty sands can be effectively sparged; dense clays will resist treatment. Pneumatic fracturing of the surficial aquifer at Site 49 may be beneficial to enhance air distribution within the target treatment zone. Air sparging technology is simple, robust, and inexpensive.	Yes

TABLE 9-1

Initial Screening of Remedial Technologies and Process Options

Site 49 Remedial Investigation/Feasibility Study

MCIEAST-MCB CAMLEJ, North Carolina

General Response Actions	Remedial Technology Types	Process Options	Descriptions	Comments	Retain for Further Evaluation
Treatment (cont'd)	In Situ Physical, Chemical Treatment (Cont'd)	Electrical Resistive Heating (ERH)	A thermal remediation technology which involves installation of electrodes in hexagonal or three point arrays and application of high voltage electrical power to cause boiling of volatile compounds in groundwater. Volatilized compounds are removed by SVE, treated, and discharged under permit.	Cost prohibitive, and not practical for low concentration plumes.	No
		Thermal Conduction Heating (TCH)	Also referred to as *In Situ* Thermal Desorption (ISTD), TCH is a thermal technology comparable to ERH. TCH involves heating the soil *in situ* by conduction/convection, using heaters installed at relatively close spacing. Although it can be more expensive, TCH is capable of producing much higher temperatures than ERH and is generally considered a more "aggressive" thermal technology than ERH.		No
		Steam Injection	The third commonly applied thermal technology, steam injection entails the introduction of hot air and team to boil off contaminants. Contaminants mobilized from the subsurface are subsequently collected in dual-phase (liquid and vapor) extraction wells located near the steam injection point. Equally effective in both saturated and unsaturated zones, and can be used in heterogeneous site conditions with careful design. However, the efficiency of steam injection for subsurface heating is reduced in zones of low permeability.	Steam injection is limited by similar constraints as air sparging. Steam injection may leave low permeability zones untreated, although some degree of thermal conduction and convection between steam channels would be expected to occur. Dense clay zones would be bypassed and resist adequate heating. In heterogeneous soils with dense clay zones, steam injection is most effective when combined with another thermal technology, such as ERH (the combined process is also known as dynamic underground stripping); however, the cost of applying this technology at Site 49 could exceed ERH or TCH alone, with questionable benefits. Steam injection alone is not expected to be as effective as either ERH or TCH, and cost would be similar, if not higher. Therefore, Steam injection is cost prohibitive, and not recommended for low concentration plumes.	No
		Surfactant, Cosolvent Flushing ("SEAR")	Introduction of a surfactant solution which enhances solvent solubility, mobility, transport, and recovery, particularly in DNAPL impacted zones in sandy formations. Generally involved closely spaced injection/recovery wells and discrete injection/recovery events, as opposed to continuous pump and treat.	Generally not recommended for application in low permeability, heterogeneous soils, where dense materials are bypassed by the injected solution. Also not practical for low concentrations plumes.	No
		In Situ Chemical Oxidation	Injection of oxidizing agents (fenton's reagent, permanganate, ozone) to promote abiotic *in situ* destruction of chlorinated organic compounds.	Permanganate and persulfate are not effective with chlorinated ethanes; potential discharge of permanganate into the downgradient river would cause aesthetic concerns; Fenton's reagent suffers from fast decomposition, i.e., short lifetime.	No
		In Situ Chemical Reduction	Injection of reducing agents (zero-valent iron) via pneumatic fracturing, atomized liquid injection, or soil mixing to promote abiotic *in situ* destruction of chlorinated organic compounds.	Generally cost-effective only for high concentration source zones. All of the injection approaches to ensure good distribution of the reagent in the subsurface are costly; likely result in incomplete degradation of the contaminants.	No
	Ex Situ Physical, Chemical Treatment	Chemical Reduction	Reducing agents (zero-valent iron) are used to destroy organic contaminants in an ex-situ reactor.	Requires pump and treat for groundwater capture and recovery. Pump and treat is not effective in heterogeneous, low permeability matrix. *Ex situ* technologies are not favorably considered for this site because cost-effective *in situ* remedies are available.	No
		Air Stripping	Volatile organics are partitioned from groundwater by increasing the surface area of the contaminated water exposed to air. Aeration methods include packed towers, diffused aeration, tray aeration, and spray aeration. Emissions from the air stripping system need to be monitored and may need to be treated to conform with federal (Clean Air Act) and local air emission monitoring requirements.		No
		Liquid-Phase Carbon Adsorption	Groundwater is pumped through a series of canisters or columns containing activated carbon to which dissolved organic contaminants adsorb. Periodic replacement or regeneration of saturated carbon is required. Wastes produced from the saturated carbon need to be properly managed.		No

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Legend
- Monitoring Well Locations
- Drainage Feature
- Treatment Target Area
- Proposed Land and Aquifer Use Control Boundary
- Buildings
- Jurisdictional Wetlands
- Site Boundary

Notes:
-Contours have been interpolated between well locations. Actual conditions may differ from those shown on this figure
-Only exceedances of one or more comparison criteria are shown

N

0 25 50 100 Feet

1 inch = 50 feet

Figure 9-1
Proposed Land Use Controls
Site 49 Remedial Investigation/Feasibility Study
MCIEAST-MCB CAMLEJ
North Carolina

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Legend

- Proposed Injection Wells
- Monitoring Well Locations
- Drainage Feature
- Treatment Target Area
- Buildings
- Jurisdictional Wetlands
- Site Boundary
- EISB DPT Injections

Note:
-Contours have been interpolated between well locations. Actual conditions may differ from those shown on this figure

N

0 25 50 100 Feet

1 inch = 50 feet

Figure 9-2
Proposed Enhanced *in situ* Bioremediation Layout
Site 49 Remedial Investigation/Feasibility Study
MCIEAST-MCB CAMLEJ
North Carolina

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Legend
- Proposed AS Wells
- Proposed Vapor Monitoring Points
- Monitoring Well Locations
- Drainage Feature
- Treatment Target Area
- Buildings
- Jurisdictional Wetlands
- Site Boundary

Notes:
-Contours have been interpolated between well locations. Actual conditions may differ from those shown on this figure
-Only exceedances of one or more comparison criteria are shown

N

0 25 50 100 Feet

1 inch = 50 feet

Figure 9-3
Proposed Air Sparging System Layout
Site 49 Remedial Investigation/Feasibility Study
MCIEAST-MCB CAMLEJ
North Carolina

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SECTION 10

Detailed Evaluation of Alternatives

The specific statutory requirements for remedial actions that must be addressed in the Record of Decision (ROD) and supported by this FS include:

- Protect human health and the environment.
- Comply with ARARs or define criteria for invoking a waiver.
- Be cost-effective.
- Utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable.
- Satisfy the preference for treatment that reduces the toxicity, mobility, and/or volume as a principal element or explain why this is not attainable.

In addition, CERCLA 121(b)(1)(A) emphasizes evaluating long-term effectiveness and related considerations for each of the alternative remedial actions. These statutory considerations include:

- Long-term uncertainties associated with land disposal
- Goals, objectives, and requirements of the Solid Waste Disposal Act (SWDA)
- Persistence, toxicity, and mobility of hazardous substances and their constituents (and their propensity to bioaccumulate)
- Short- and long-term potential for adverse health effects from human exposure
- Long-term maintenance costs
- Potential for future remedial action costs if the alternative were to fail
- Potential threat to human health and the environment associated with excavation, transportation, and re-disposal, or containment

USEPA has developed nine evaluation criteria that address these statutory requirements and additional technical and policy considerations that are important for a CERCLA remedial action. The nine criteria serve as the basis for conducting the detailed analyses during the FS process and for subsequently selecting an appropriate remedial action. In this section, the remedial alternatives developed in Section 4 are analyzed individually against these nine evaluation criteria and then evaluated comparatively to identify key tradeoffs.

Additionally, a sustainability assessment was conducted using SiteWise Version 2.0, a stand-alone tool that assesses the environmental footprint of a remedial alternative to compare the overall life-cycle environmental impacts of each remedy (Battelle, 2011). The sustainability assessment does not replace any of the nine criteria; however, it provides an additional comparison criterion that may allow options with a smaller environmental impact to be selected when all other criteria are met. The results of the sustainability assessment are provided in **Appendix J**.

10.1 Evaluation Criteria

The nine evaluation criteria developed by USEPA are described in the following subsections.

10.1.1 Protection of Human Health and the Environment

The assessment against this criterion evaluates how each alternative, as a whole, achieves and maintains protection of human health and describes how site risks are eliminated, reduced, or controlled through treatment, engineering, or ICs. This assessment also allows for consideration of whether the alternative poses unacceptable short-term or cross-media impacts.

10.1.2 Compliance with ARARs

This evaluation criterion is used to determine whether an alternative would meet all of its federal, state, and local ARARs, as identified in Section 8.3. The analysis should summarize which requirements are applicable or relevant and appropriate for each alternative and describe the extent to which the alternative meets these requirements. If a waiver is required because an ARAR is not met, the basis for justification should be discussed.

10.1.3 Long-term Effectiveness and Permanence

Long-term effectiveness and permanence are measured in terms of the risk remaining at the site after response objectives have been met. Alternatives providing the highest degree of long-term effectiveness and permanence are those that leave little or no waste at the site, do not require long-term maintenance and monitoring, and minimize the need for ICs. The evaluation of this criterion includes consideration of the following factors:

- The magnitude of residual risk to human and environmental receptors posed by any untreated waste or treatment residues remaining at the conclusion of remedial activities
- The type, degree, and adequacy of long-term controls required to manage untreated waste or treatment residues at the conclusion of remedial activities
- The long-term reliability of engineering and/or institutional actions to provide continued protection from residuals
- The potential need to replace technical components of the alternative and the potential exposure pathway and risks posed should the remedial action need replacement

10.1.4 Reduction of Toxicity, Mobility, or Volume through Treatment

This evaluation criterion addresses the statutory preference for selecting remedial actions that employ treatment technologies that permanently and significantly reduce the toxicity, mobility, or volume of hazardous substances. This evaluation focuses on the following factors for each remedial alternative:

- The treatment process or processes the alternative will employ and the material or materials it will treat
- The amount of hazardous substances that will be destroyed or treated, including how the principal risk or risks will be addressed
- The degree of expected reduction in the toxicity, mobility, or volume measured as a percentage of reduction
- The degree to which the treatment will be irreversible
- The type and quantity of residuals that will remain following treatment
- Whether the alternative would satisfy the statutory preference for treatment as a principal element

10.1.5 Short-term Effectiveness

This evaluation criterion addresses the effects of the alternative during the construction and implementation phase until remedial response objectives are met. The following factors should be addressed for each alternative:

- Short-term risks that may be posed to the community during construction and implementation of an alternative
- Potential adverse impacts to workers that may occur during construction and implementation, including an evaluation of the effectiveness and reliability of any protective measures that would be taken
- Potential adverse environmental impacts that may result from the construction and implementation of an alternative, including an evaluation of the reliability of available mitigation measures in preventing or reducing the potential impacts
- Estimate of the time required to achieve remedial response objectives

Sustainability

Sustainability is not one of the nine evaluation criteria. However, when comparing alternatives, opportunities for green and sustainable solutions should be considered to reduce the environmental footprint of remedy components and consider the overall net environmental benefit consistent with the Navy's Environmental Strategy (Navy, 2011). As such, the sustainability evaluation, using SiteWise Version 2.0, will be discussed under the short-term effectiveness evaluation.

The Navy, in cooperation with the United States Army Corps of Engineers and Battelle, has developed a tool to incorporate sustainability metrics into the selection of remedial alternatives. SiteWise tracks the environmental footprint of remedial actions in terms of a consistent set of sustainability metrics: greenhouse gas (GHG) emissions (in metric tons of carbon dioxide equivalents), energy use (in million British Thermal Units [MBTU]), criteria air emissions (including metric tons of: nitrogen oxides [NOx], sulfur oxides [SOx], and particulate matter less than 10 micrometers in diameter [PM_{10}]), water consumption (in gallons), and worker safety (accident risks – injury and fatality). SiteWise provides a comparative assessment of different remedial alternatives based on significant life-cycle impacts of each alternative, including material production (for example, PVC for well materials or substrate for EISB injections), transportation of equipment, personnel, and materials to the site, equipment use during implementation, electricity use to run equipment or pumps during the operations phase of a remedy, and residuals handling (Battelle, 2011).

Results of the SiteWise analysis are provided in terms of comparative "footprints" where a lower footprint is more desirable because it indicates lower potential deleterious environmental effects or accident risks. Since many of the assumptions in SiteWise are based on industry standards instead of site-specific or particular remedy equipment and materials information, they should not be viewed as the actual impacts of each remedy. Rather, the results should be viewed as relative comparisons. The full results of the SiteWise model are provided in **Appendix J.**

10.1.6 Implementability

This criterion addresses the technical and administrative feasibility of implementing an alternative and the availability of various services and materials required during its implementation. The following factors are considered during analysis of this criterion:

- Technical Feasibility
  - Ability to construct and operate
  - Reliability of the technology
  - Ease of undertaking additional remedial action, if needed
  - Ability to monitor effectiveness
- Administrative Feasibility
  - Ability to obtain approvals and coordinate with other agencies
- Availability of Services and Materials
  - Availability of adequate offsite treatment, storage capacity, and disposal services
  - Availability of necessary equipment, specialists, and provisions
  - Availability of services and materials, including the potential for obtaining competitive bids
  - Availability of prospective technologies

10.1.7 Cost

Preliminary cost estimates were developed for each remedial alternative. These cost estimates are used to compare the alternatives, not to bid the work. These estimates were made from available information, (that is, they have an expected accuracy of -30 percent to +50 percent for the scope of action described for each alternative). The estimates are divided into capital costs and O&M costs (which also include LTM costs) and are based on information from vendors, regulators, and experience from similar projects. The present worth of the capital cost and O&M is included. A 7.0 percent discount rate was used to calculate all present worth costs in accordance with USEPA guidance (USEPA, 2000c). Details of these cost estimates are included in **Appendix H**. Significant uncertainties that may affect cost are discussed with each alternative.

10.1.8 State Acceptance

This assessment evaluates the technical and administrative issues and concerns the state may have regarding each of the alternatives. NCDENR will review and comment on this FS.

10.1.9 Community Acceptance

This assessment evaluates the issues and concerns the public may have regarding each of the alternatives. As with state acceptance, community concerns will be used to evaluate each remedy in this FS. Consistent with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), public comments will be solicited on the selected alternative presented in the Proposed Remedial Action Plan. Any comments will be addressed in the ROD and will be considered by USEPA in the selection of the remedy.

10.2 Individual Analysis of Alternatives

Seven of the nine USEPA criteria were used in the detailed analysis of the alternatives. State and community acceptance will be evaluated for the alternatives following a Public Meeting and the Proposed Remedial Action Plan. The analyses are summarized in **Table 10-1**, and costs are provided in **Table 10-2**.

10.2.1 Alternative 1 – No Action

Protection of Human Health and the Environment

The No Action alternative is not considered to be protective of human health or the environment. As discussed in Section 6.5, the findings of the HHRA indicate that the groundwater presents unacceptable risk conditions if used for potable purposes by residential receptors. This alternative does not provide treatment, engineering, or ICs that would mitigate exposure risks to receptors.

Compliance with ARARs

This alternative does not include any remedial actions such as land disturbing, well installation, injections, or waste handling, so it would meet action-specific ARARs with the exception of ICs for COCs left in place. This alternative would not likely meet location-specific ARARs since COCs left in place may impact sensitive ecosystems. This alternative does not meet chemical-specific ARARs for groundwater since concentrations exceed applicable NCGWQS or MCLs.

Long-term Effectiveness and Permanence

This alternative would not meet the long-term effectiveness criterion because the plume would not be monitored, and there would be no mechanism for limiting future exposure to contaminated groundwater. There is high uncertainty of whether RAOs would be achieved.

Reduction of Toxicity, Mobility, or Volume through Treatment

This alternative does not include active treatment. Continuation of occurrence of natural destructive degradation processes, including biotic or abiotic degradation, at this site is uncertain. Without a monitoring component, reduction in toxicity, mobility, and volume of site-related COCs would remain unknown and undocumented.

Short-term Effectiveness

Although there would be no remedial construction and no immediate human health impacts from this remedy, COC concentrations in the plumes would not decrease below cleanup levels within the short-term.

Implementability and Cost

There would be no implementability concerns or costs associated with this remedy.

10.2.2 Alternative 2 – MNA and LUCs

Protection of Human Health and the Environment

Alternative 2 – MNA and LUCs is considered protective of human health and the environment because site-related COCs would degrade over time from natural processes, and LUCs would be maintained until RAOs are achieved, mitigating potential human health risks from exposure to impacted site media.

Compliance with ARARs

This alternative would comply with ARARs, as COCs would eventually attenuate below chemical-specific ARARs. LUCs would be in place until RAOs are achieved, and LTM would be conducted to monitor COC degradation.

Long-term Effectiveness and Permanence

This alternative would eventually meet the long-term effectiveness and permanence criterion when COCs have naturally attenuated below the NCGWQS or MCL. The time-frame to reach NCGWQS or MCLs is approximately 30 years because, although the concentrations of COCs are relatively low (less than 100 µg/L), the natural attenuation evaluation in Section 5 indicated that surficial aquifer biogeochemical conditions may be not favorable for biotic natural attenuation processes.

Reduction of Toxicity, Mobility, or Volume through Treatment

This alternative does not employ an active treatment process for the plume, relying instead on natural degradation and other attenuation processes to remediate the plume. Therefore, reduction of toxicity, mobility, and volume of the plumes is acceptable, but assumed to be slow.

Short-term Effectiveness

This alternative does not include any initial construction that would put the environment, workers, or the community at risk. However, based on the sustainability analysis, transportation of personnel to and from the site for LTM, and transportation and disposal of IDW generated during sampling events will contribute to environmental (primarily GHG and criteria air pollutants) and worker safety impacts throughout the life of the remedy.

Implementability

This alternative is technically feasible for this site and could be easily implemented with available labor, materials, and equipment.

Costs

The total 30-year present worth cost for this alternative is estimated to be $167,000. The capital cost for this alternative is estimated to be $13,000. The present worth O&M cost is estimated to be $154,000. Capital costs associated with this alternative include LUC implementation activities and annual costs are driven by LTM costs.

10.2.3 Alternative 3 – EISB with LUCs and LTM

Protection of Human Health and the Environment

Alternative 3 – EISB with LUCs and LTM is considered protective of human health and the environment because site-related COCs would be reduced over time. LUCs and groundwater monitoring would be maintained until RAOs are achieved, mitigating potential human health risks from exposure to impacted site media.

Compliance with ARARs

This alternative would comply with ARARs. Chemical-specific ARARs would be achieved through reduction of COCs by enhanced bioremediation and monitoring. Location-specific ARARs regarding construction within a wetland will be achieved by following substantive standards related to wetlands. Action-specific ARARs regarding injection well installation, underground injections, and waste handling will be complied with during each activity of this alternative. LUCs would prevent groundwater use before RAOs are achieved.

Long-term Effectiveness and Permanence

This alternative is expected to achieve long-term effectiveness and permanence. However, with injection technologies, there is a possibility of rebound. Rebound occurs when contaminants are treated in readily accessed flow paths but residual contaminants are left behind, either sorbed to the soil or trapped in less transmissive zones. After active treatment is complete, the residual contaminants re-enter the aquifer through diffusion and dissolution. Re-injection of substrate may be required based on performance monitoring results. Permanent risk reduction time line is determined by time required for biodegradation of VOCs and the distribution of the substrate within the contaminated media. Since the surficial aquifer matrix is composed of clay and silty sand, rebound is highly likely and substrate distribution is expected to be poor.

Reduction of Toxicity, Mobility, or Volume through Treatment

This alternative relies on enhanced biodegradation, which is a permanent destruction process that will reduce the toxicity, mobility, and volume of groundwater COCs. With biological degradation, there is a possibility that degradation might stall and an accumulation of harmful daughter products such as VC may occur. Monitoring of biological populations and bioaugmentation (addition of suitable microbial populations into the system) may be required to ensure complete destruction. As discussed in long-term effectiveness and permanence, the microbial populations need to be adequately distributed within the contaminated media in order to be effective. Since the aquifer media appears to be heterogeneous with clayey layers interbedded with more conductive sandy layers, poor distribution is likely and will limit the effectiveness of EISB.

Short-term effectiveness

The short-term effectiveness of this alternative is primarily contingent on engineering controls to protect the environment, workers, and the community during injection well installation and injections. There are few to no risks to site workers if they come into contact with the substrate during injection activities; however, engineering and safety controls would be in place to protect site workers and the environment. Releases of the substrate may occur through short-circuiting or “day lighting” when the injected substrate flows through preferential pathways to the ground surface. This is especially common when injecting into low permeability aquifer matrixes, there will likely be preferential flow channels that prevent full contact with contaminated water. The results of the sustainability assessment indicate that transportation (personnel, materials, and equipment) would contribute the highest proportion of GHG and total energy footprints. Drilling and pump operation contribute to the majority of the criteria air pollutant footprints. Transportation of personnel and equipment also contribute to the accident risk fatality footprint, and onsite labor hours contributed to the majority of the accident risk injury footprint. Field implementation is anticipated to take less than 1 month to complete.

Implementability

Materials and equipment for EISB are available. However, implementation of EISB injections would be difficult due to the heterogeneous nature of the surficial aquifer matrix that would need to be treated. Substrate distribution will be limited, and the ROI of EISB injections is estimated at approximately 7.5 ft.

Costs

The total present worth cost for this alternative is estimated to be $355,000.The capital cost for this alternative is estimated to be $183,000. The present-worth O&M and LTM cost is estimated to be $172,000. Capital costs associated with this alternative include injection well installation, initial EISB substrate injection, and baseline sampling activities, and annual costs are driven by a second EISB injection and LTM costs.

10.2.4 Alternative 4 – AS with LUCs and LTM

Protection of Human Health and the Environment

Alternative 4 – AS with LUCs and LTM, is considered protective of human health and the environment because site-related COCs would be physically removed. LUCs and groundwater monitoring would be maintained until RAOs are achieved, mitigating potential human health risks from exposure to impacted site media.

Compliance with ARARs

This alternative would comply with chemical-specific ARARs by reducing the concentrations of COCs through air-stripping and stimulation of aerobic degradation. No occupied buildings are located within 100 ft of the contaminant plume so VI is not considered a complete pathway. Location-specific ARARs, including proximity to wetlands, and action-specific ARARs, including well installation, subsurface injections, potential air emissions, and waste handling ARARs, will be complied with throughout implementation of this alternative.

Long-term Effectiveness and Permanence

This alternative is considered to meet the long-term effectiveness and permanence criterion. The system is expected to operate for 3 years followed by seven years of monitoring to identify potential rebound and evaluate long term effectiveness. The AS system relies on regular maintenance of equipment and could potentially involve replacement of parts to keep the system operational. As discussed in Section 10.2.3, the surficial aquifer matrix consists of low permeability clayey soil interbedded with sandy soil which would inhibit air contact and effectiveness of the sparging system.

Reduction of Toxicity, Mobility, and Volume through Treatment

AS has the potential to significantly reduce toxicity and volume of the plume. However, AS is not a destructive process, and the transferred mass of VOCs, if not biodegraded aerobically in the vadose zone, would release into the atmosphere. The less permeable surficial aquifer will reduce the effectiveness of AS, resulting in moving the contaminants laterally through more permeable zones instead of physically removing them. Furthermore, AS is less effective against 1,1,2,2-PCA than the other COCs; thus, removal of 1,1,2,2-PCA may be the controlling factor of success of the AS process.

Short-term Effectiveness

The short-term effectiveness of this alternative is contingent on engineering controls to protect the environment, workers, and the community during well installation and operations. The results of the sustainability assessment indicated electricity to power the compressor for 3 years contributed to the majority of GHG, total energy, NO_X, SO_X, and water-use footprints. Drilling activities accounted for the majority of the PM_{10} footprint. Transportation of personnel, materials, and IDW accounted for the majority of the accident risk fatality footprint, and onsite labor hours contributed to the majority of the accident risk injury footprint. Field implementation is anticipated to take less than 1 month to complete.

Implementability

Similar to EISB, short-circuiting through the more conductive zones that occur naturally in the surficial aquifer may prevent adequate air contact and limit the effectiveness. Additionally, since the ROI is relatively small, it requires the installation of several wells. The operating system may need periodic checking and maintenance. Malfunctions of the equipment may cause delays and downtime.

Costs

The total present worth cost for this alternative is estimated to be $462,000. The capital cost for this alternative is estimated to be $168,000. The total present worth O&M and LTM cost is estimated to be $294,000.

10.3 Comparative Analysis of Remedial Alternatives

In the following subsections, the alternatives are comparatively analyzed using seven of the nine USEPA criteria. The analyses are summarized in **Table 10-1**.

10.3.1 Overall Protection of Human Health and the Environment

All alternatives, with the exception of Alternative 1, are protective of human health and the environment. Long-term or performance monitoring would be conducted, and LUCs would be maintained to provide adequate protection of human health and the environment by controlling exposure to contaminated site media until the RAOs are met.

10.3.2 Compliance with ARARs

All alternatives, with the exception of Alternative 1, are expected to comply with ARARs. Alternatives 2, 3, and 4 would all require measures to be taken to comply with performance monitoring and LUCs. Additionally, Alternatives 3 and 4 would also comply with ARARs related to underground injections. The ARARs are presented in Section 8.1.

Long-term Effectiveness and Permanence

With the exception of Alternative 1, all alternatives are expected to be effective in the long-term. Alternative 2 would take the longest to achieve RAOs because it relies on natural attenuation, whereas Alternative 3 provides enhanced conditions for biodegradation if contact with the contaminated media is made, which is difficult in the clayey layers of the surficial aquifer. AS (Alternative 4) typically removes contaminants more quickly than the other alternatives under consideration; however, thorough distribution of air through the clay matrix would be difficult at this Site, and it will likely be ineffective. Rebounding is also a potential issue from any injection or sparging scenario and could affect the long-term effectiveness of Alternatives 3 and 4. As a result, multiple injections or system restart may be required; however, it is less labor intensive to restart the compressor than to re-inject substrate.

Reduction of Toxicity, Mobility, and Volume through Treatment

All alternatives, with the exception of Alternative 1, are expected to reduce the toxicity, mobility, and volume of contaminants. Alternative 2 does not actively provide treatment; however, this criterion will be achieved through natural attenuation. Alternatives 3 and 4 provide active treatment that could potentially reduce COC concentrations more quickly than natural attenuation alone. As previously discussed, the effectiveness of Alternatives 3 and 4 is dependent on adequate distribution and contact throughout the contaminated media.

Short-term Effectiveness

Alternative 1 would have the lowest environmental impacts from a sustainability viewpoint because there are no resource-intensive actions associated with this alternative. However, "no action" is not a viable alternative and has the lowest short-term effectiveness. Alternative 2 has similar short-term effectiveness compared with the remaining alternatives; however, it has minimal actions resulting in minimal environmental impacts whereas Alternatives 3 and 4 require installation of injection wells, operation of drill rigs, and operation of other heavy equipment to support injections or air sparge system installation. The field timeframes for Alternatives 3 and 4 are roughly 1 month each to install. Alternative 4 would operate for months or years.

The SiteWise results indicated that Alternative 2 would have the lowest environmental footprints (GHG, total energy, and criteria air pollutant footprints). Alternative 4 had the largest GHG, total energy, NO_X, and SO_X footprints compared with the other alternatives. Alternative 3 had high water-use and PM_{10} footprints similar to Alternative 4. Accident risks from the SiteWise analysis were similar for all alternatives because the total transportation to and from the site and the number of onsite labor hours is similar when taking LTM into account.

Implementability

Alternative 1 is the easiest to implement because there is no action involved. Alternative 2 is the second easiest to implement because it involves minimal actions. Alternatives 3 and 4 will be more difficult than Alternatives 1 and 2, because subsurface injections or sparging within the surficial aquifer matrix will be difficult to distribute resulting in the potential for day lighting or incomplete treatment.

Costs

An order of magnitude cost for each alternative has been estimated based on a variety of key assumptions, as specified in the cost estimates (**Appendix H**). The timeframes required to achieve the RAOs vary among alternatives. Significant uncertainty is associated with the timeframes. Order of magnitude cost estimates have been prepared in accordance with USEPA (2000c) guidance and represent a -30 percent to +50 percent range of accuracy.

Costs are provided in **Table 10-2,** which shows the estimated capital, O&M, and total present value costs of each alternative. Other than the No Action Alternative (Alternative 1), the least expensive alternative was Alternative 2, with an estimated total present value of $167,000, followed by Alternative 3 with an estimated total present value of $355,000. Alternative 4 was the most expensive alternative with a total present cost of $463,000. Alternative 2 also has the lowest total capital cost, estimated at $13,000. Alternatives 3 and 4 have estimated capital costs of $183,000 and $168,000, respectively.

TABLE 10-1

Summary of Groundwater Remedial Alternatives

Site 49 Remedial Investigation/Feasibility Study

MCIEAST-MCB CAMLEJ, North Carolina

Evaluation Criteria	Alternative 1 No Action	Alternative 2 MNA, LUCs and LTM	Alternative 3 EISB, LUCs, and LTM	Alternative 4 AS, LUCs, and LTM
Overall Protection of Human Health and the Environment	Does not prevent exposure to COCs or provide measures to reduce site-related COC concentrations to achieve RAOs.	Protective of human health and the environment. Prolonged period of time required to meet RAOs due to reliance on natural biodegradation. LUCs prevent exposure to COCs until RAOs are met.	Protective of human health and the environment. Enhanced biodegradation will reduce COC concentrations more quickly than natural attenuation, LUCs will prevent exposure to COCs until RAOs are met.	Protective of human health and the environment. Mass transfer of VOCs from groundwater to air and aerobic biodegradation will reduce COC concentrations, LUCs will prevent exposure to COCs until RAOs are met.
Compliance with ARARs	Does not comply with chemical-specific or location-specific ARARs.	Complies with ARARs	Complies with ARARs	Complies with ARARs
Long-term Effectiveness and Permanence	Will not reduce risk; therefore, is not effective in the long term. Additionally, no mechanism is in place to monitor (1) attenuation of VOCs and (2) potential migration of plume into deeper aquifers.	Expected to be an effective and permanent remedy for treatment of groundwater if land use controls are in place and groundwater is monitored to ensure that the COCs are not migrating. Permanent risk reduction is achieved when contaminants attenuate below the appropriate standards.	Expected to be an effective and permanent remedy for treatment of groundwater. Permanent risk reduction time-line is determined by the time required for biodegradation of the VOCs. Re-injection of the substrate may be required if rebounding is observed or if the substrate has been consumed.	Expected to be an effective and permanent remedy for treatment of groundwater. Permanent risk reduction time-line is determined by the ability for air to contact the impacted groundwater. Rebounding or migration of the COCs may occur. LUCs and monitoring is required until COCs have been reduced below the appropriate standards.
Reduction of Toxicity, Mobility or Volume Through Treatment	No treatment is involved, so it does not meet this criterion.	Reduces toxicity, mobility, and volume over a prolonged period of time by naturally degrading contaminants.	Reduces toxicity, mobility, or volume through introduction of electron donors allowing increased reductive dechlorination.	Reduces toxicity, mobility, or volume through mass transfer (stripping) VOCs from groundwater, and stimulating aerobic degradation.
Short-term Effectiveness	No short-term impacts because nothing is implemented.	Due to the natural attenuation process, COCs are expected to remain above NCGWQS for at least 30 years. Monitoring would be required during the duration of remediation. Based on the sustainability analysis, transportation of personnel and residuals is the primary contributor to life-cycle environmental impacts and worker safety risks. This alternative has minimal activities and therefore low risk to workers and the environment in the short-term to implement.	Engineering controls will be required during well installation and injection activities to protect workers, the community, and the environment. The results of the sustainability assessment indicate transportation of materials, equipment, and personnel for the injection activities contributed the most to GHG and total energy footprints. Water for dilution of the EISB substrate was the primary contributor to the water use footprint. Drilling during injection well installation and pump use during injections contributed to the criteria air pollutant footprints. Transportation of personnel, materials, and IDW accounted for the majority of the fatality risks, and onsite labor hours contributed to the majority of the injury risks. Field implementation is anticipated to take less than 1 month to complete.	Engineering controls will be required during well installation to protect the environment, and safety controls to protect workers. The results of the sustainability assessment indicated electricity to power the compressor for 3 years contributed to the majority of GHG, total energy, SOx, water use and NOx footprint. Drilling accounted for the majority of the PM10 footprint. Transportation of personnel, materials, and IDW accounted for the majority of the accident risk fatality footprint, and onsite labor hours contributed to the majority of the accident risk injury footprint. Field implementation is anticipated to take less than 1 month to complete.
Implementability	No construction or operation.	Services and materials are available; and the technology is easily implementable.	Services and materials are available; and the technology is implementable. The heterogeneous nature of the surficial aquifer matrix will likely inhibit substrate distribution and limit the effectiveness of this alternative.	Services and materials are available; and the technology is implementable. The heterogeneous nature of the surficial aquifer matrix will likely inhibit air distribution and limit the effectiveness of this alternative.
Total Present Worth Cost	$0	$167,000	$355,000	$463,000

TABLE 10-2

Summary of Cost Analysis

Site 49 Remedial Investigation/Feasibility Study

MCIEAST-MCB CAMLEJ, North Carolina

General Response Action	Alternative 2 MNA and LUCs[a]			Alternative 3 EISB, LUCs and LTM[b]			Alternative 4 Air Sparging, LUCs and LTM[c]		
	-30%	Estimate	+50%	-30%	Estimate	+50%	-30%	Estimate	+50%
Total Capital Costs	**$9,100**	**$13,000**	**$19,500**	**$128,100**	**$183,000**	**$274,500**	**$118,300**	**$169,000**	**$253,500**
Subsequent Years' Costs	$107,800	$154,000	$231,000	$120,400	$172,000	$258,000	$205,800	$294,000	$441,000
Total Present Worth Costs[d]	**$116,900**	**$167,000**	**$250,500**	**$248,500**	**$355,000**	**$532,500**	**$324,100**	**$463,000**	**$694,500**

[a] Includes 30 years of biennial GW monitoring

[b] Includes 4 years of GW monitoring

[c] Includes 3 years of system operations and 7 years of GW monitoring after system shut down

[d] Includes 7% discount rate

SECTION 11
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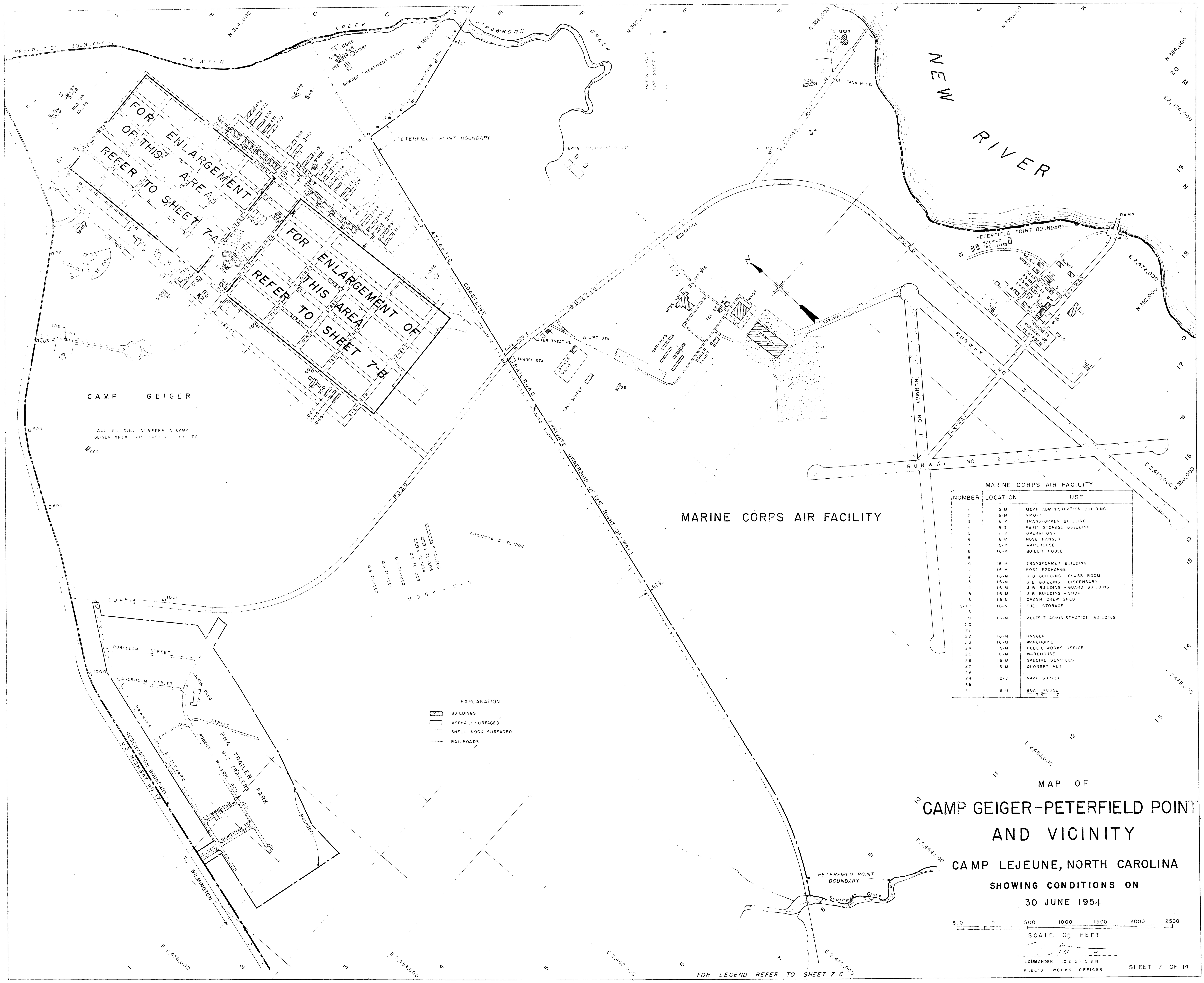
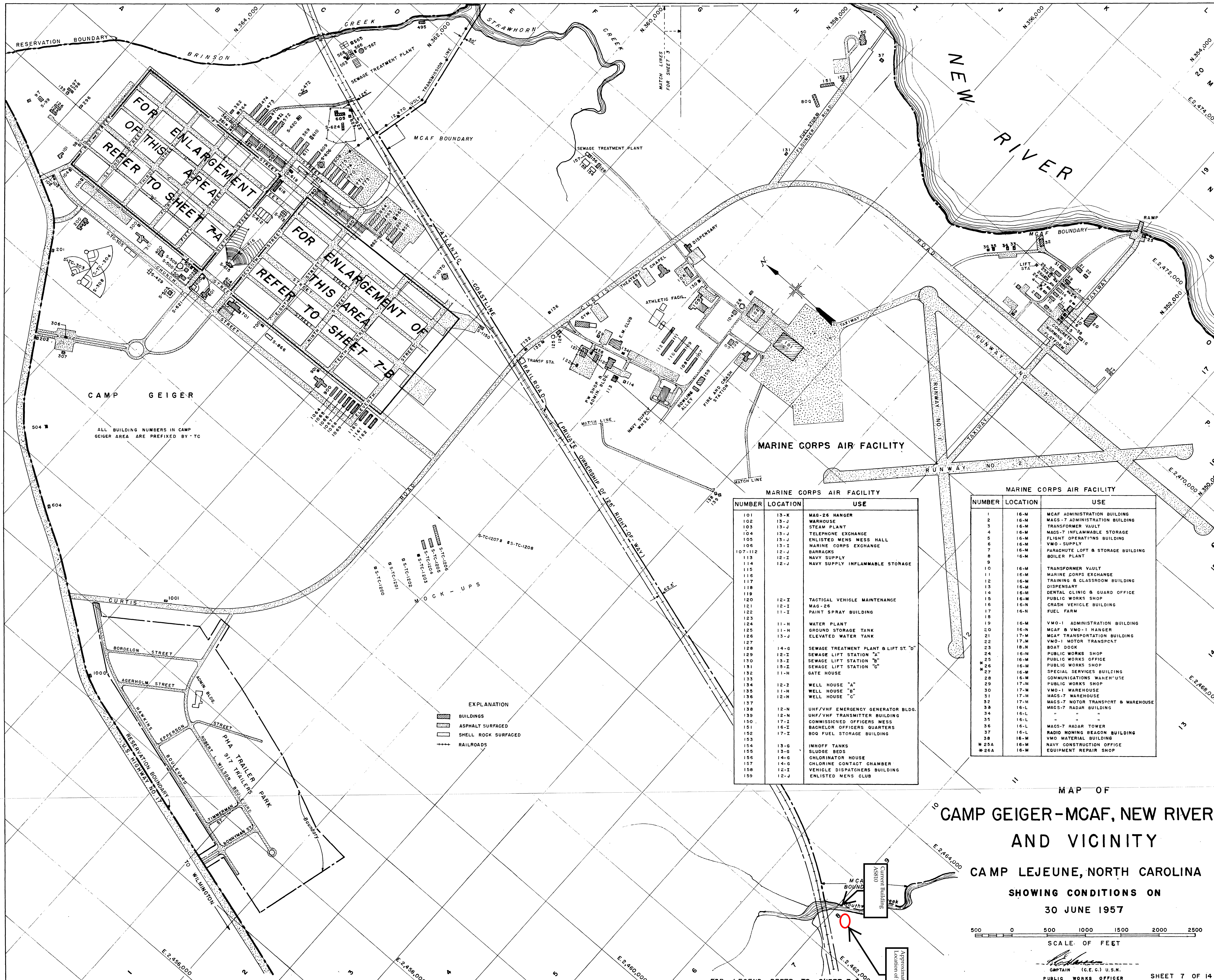
Appendix A
Historical Maps and Aerial Photographs



NUMBER	LOCATION	USE
1	16-M	MCAF ADMINISTRATION BUILDING
2	16-M	VMO-1
3	16-M	TRANSFORMER BUILDING
4	16-I	PAINT STORAGE BUILDING
5	16-M	OPERATIONS
6	16-M	NOSE HANGER
7	16-M	WAREHOUSE
8	16-M	BOILER HOUSE
9		
10	16-M	TRANSFORMER BUILDING
11	16-M	POST EXCHANGE
12	16-M	U B BUILDING - CLASS ROOM
13	16-M	U.B BUILDING - DISPENSARY
14	16-M	U B BUILDING - GUARD BUILDING
15	16-M	U B BUILDING - SHOP
16	16-N	CRASH CREW SHED
S-17	16-N	FUEL STORAGE
18		
19	16-M	MCGIS-7 ADMINISTRATION BUILDING
20		
21		
22	16-N	HANGER
23	16-M	WAREHOUSE
24	16-M	PUBLIC WORKS OFFICE
25	16-M	WAREHOUSE
26	16-M	SPECIAL SERVICES
27	16-M	QUONSET HUT
28		
29	12-J	NAVY SUPPLY
30		
31	18-N	BOAT HOUSE

RESTRICTED CAMP LEJEUNE, N.C



MARINE CORPS AIR FACILITY

NUMBER	LOCATION	USE
101	13-K	MAG-26 HANGER
102	13-J	WARHOUSE
103	13-J	STEAM PLANT
104	13-J	TELEPHONE EXCHANGE
105	13-J	ENLISTED MENS MESS HALL
106	13-I	MARINE CORPS EXCHANGE
107-112	12-J	BARRACKS
113	12-I	NAVY SUPPLY
114	12-J	NAVY SUPPLY INFLAMMABLE STORAGE
115		
116		
117		
118		
119		
120	12-I	TACTICAL VEHICLE MAINTENANCE
121	12-I	MAG-26
122	11-I	PAINT SPRAY BUILDING
123		
124	11-H	WATER PLANT
125	11-H	GROUND STORAGE TANK
126	13-J	ELEVATED WATER TANK
127		
128	14-G	SEWAGE TREATMENT PLANT & LIFT ST. "D"
129	12-I	SEWAGE LIFT STATION "A"
130	13-I	SEWAGE LIFT STATION "B"
131	15-I	SEWAGE LIFT STATION "C"
132	11-H	GATE HOUSE
133		
134	12-I	WELL HOUSE "A"
135	11-H	WELL HOUSE "B"
136	12-H	WELL HOUSE "C"
137		
138	12-N	UHF/VHF EMERGENCY GENERATOR BLDG.
139	12-N	UHF/VHF TRANSMITTER BUILDING
150	17-I	COMMISSIONED OFFICERS MESS
151	16-I	BACHELOR OFFICERS QUARTERS
152	17-I	BOQ FUEL STORAGE BUILDING
153		
154	13-G	IMHOFF TANKS
155	13-G	SLUDGE BEDS
156	14-G	CHLORINATOR HOUSE
157	14-G	CHLORINE CONTACT CHAMBER
158	12-I	VEHICLE DISPATCHERS BUILDING
159	12-J	ENLISTED MENS CLUB

MARINE CORPS AIR FACILITY

NUMBER	LOCATION	USE
1	16-M	MCAF ADMINISTRATION BUILDING
2	16-M	MACS-7 ADMINISTRATION BUILDING
3	16-M	TRANSFORMER VAULT
4	16-M	MACS-7 INFLAMMABLE STORAGE
5	16-M	FLIGHT OPERATIONS BUILDING
6	16-M	VMO-SUPPLY
7	16-M	PARACHUTE LOFT & STORAGE BUILDING
8	16-M	BOILER PLANT
9		
10	16-M	TRANSFORMER VAULT
11	16-M	MARINE CORPS EXCHANGE
12	16-M	TRAINING & CLASSROOM BUILDING
13	16-M	DISPENSARY
14	16-M	DENTAL CLINIC & GUARD OFFICE
15	16-M	PUBLIC WORKS SHOP
16	16-N	CRASH VEHICLE BUILDING
17	16-N	FUEL FARM
18		
19	16-M	VMO-1 ADMINISTRATION BUILDING
20	16-N	MCAF & VMO-1 HANGER
21	17-M	MCAF TRANSPORTATION BUILDING
22	17-M	VMO-1 MOTOR TRANSPORT
23	18-N	BOAT DOCK
24	16-M	PUBLIC WORKS SHOP
25	16-M	PUBLIC WORKS OFFICE
*26	16-M	PUBLIC WORKS SHOP
*27	16-M	SPECIAL SERVICES BUILDING
28	16-M	COMMUNICATIONS WAREHOUSE
29	17-M	PUBLIC WORKS SHOP
30	17-M	VMO-1 WAREHOUSE
31	17-M	MACS-7 WAREHOUSE
32	17-M	MACS-7 MOTOR TRANSPORT & WAREHOUSE
33	16-L	MACS-7 RADAR BUILDING
34	16-L	" " "
35	16-L	" " "
36	16-L	MACS-7 RADAR TOWER
37	16-L	RADIO HOMING BEACON BUILDING
38	16-M	VMO MATERIAL BUILDING
*25A	16-M	NAVY CONSTRUCTION OFFICE
*26A	16-M	EQUIPMENT REPAIR SHOP

MAP OF

CAMP GEIGER-MCAF, NEW RIVER AND VICINITY

CAMP LEJEUNE, NORTH CAROLINA

SHOWING CONDITIONS ON

30 JUNE 1957

500 0 500 1000 1500 2000 2500

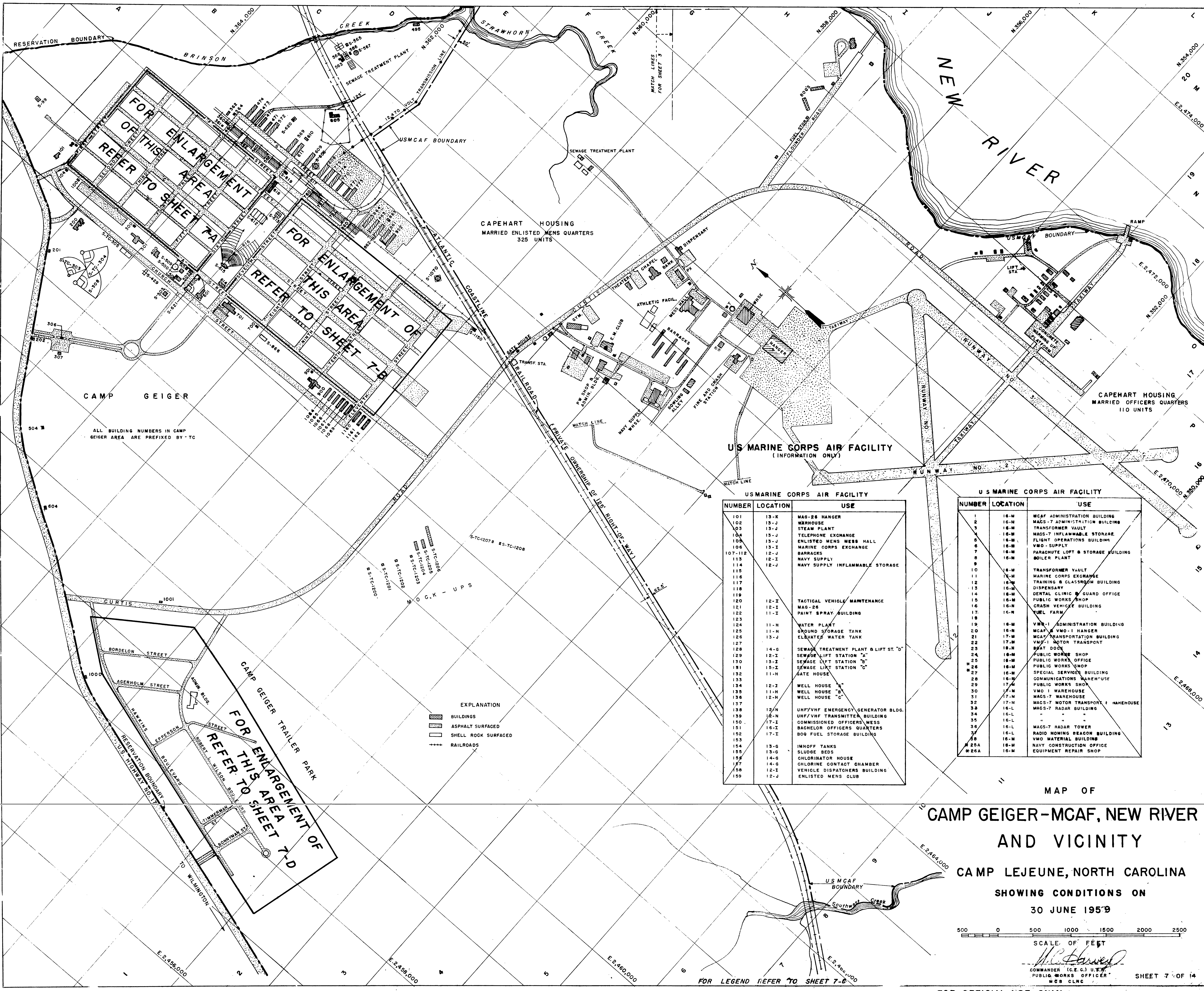
SCALE OF FEET

CAPTAIN (C.E.C.) U.S.N.
PUBLIC WORKS OFFICER

SHEET 7 OF 14

FOR OFFICIAL USE ONLY

CAMP LEJEUNE, N.C.



US MARINE CORPS AIR FACILITY

NUMBER	LOCATION	USE
101	13-K	MAG-26 HANGER
102	13-J	WARHOUSE
103	13-J	STEAM PLANT
104	13-J	TELEPHONE EXCHANGE
105	13-J	ENLISTED MENS MESS HALL
106	13-I	MARINE CORPS EXCHANGE
107-112	12-J	BARRACKS
113	12-I	NAVY SUPPLY
114	12-J	NAVY SUPPLY INFLAMMABLE STORAGE
115		
116		
117		
118		
119		
120	12-I	TACTICAL VEHICLE MAINTENANCE
121	12-I	MAG-26
122	11-I	PAINT SPRAY BUILDING
123		
124	11-H	WATER PLANT
125	11-H	GROUND STORAGE TANK
126	13-J	ELEVATED WATER TANK
127		
128	14-G	SEWAGE TREATMENT PLANT & LIFT ST. "D"
129	12-I	SEWAGE LIFT STATION "A"
130	13-I	SEWAGE LIFT STATION "B"
131	15-I	SEWAGE LIFT STATION "C"
132	11-H	GATE HOUSE
133		
134	12-I	WELL HOUSE "A"
135	11-H	WELL HOUSE "B"
136	12-H	WELL HOUSE "C"
137		
138	12-N	UHF/VHF EMERGENCY GENERATOR BLDG.
139	12-N	UHF/VHF TRANSMITTER BUILDING
150	17-I	COMMISSIONED OFFICERS MESS
151	16-I	BACHELOR OFFICERS QUARTERS
152	17-I	BOQ FUEL STORAGE BUILDING
153		
154	13-G	IMHOFF TANKS
155	13-G	SLUDGE BEDS
156	14-G	CHLORINATOR HOUSE
157	14-G	CHLORINE CONTACT CHAMBER
158	12-I	VEHICLE DISPATCHERS BUILDING
159	12-J	ENLISTED MENS CLUB

U S MARINE CORPS AIR FACILITY

NUMBER	LOCATION	USE
1	16-M	MCAF ADMINISTRATION BUILDING
2	16-M	MACS-7 ADMINISTRATION BUILDING
3	16-M	TRANSFORMER VAULT
4	16-M	MACS-7 INFLAMMABLE STORAGE
5	16-M	FLIGHT OPERATIONS BUILDING
6	16-M	VMO-SUPPLY
7	16-M	PARACHUTE LOFT & STORAGE BUILDING
8	16-M	BOILER PLANT
9		
10	16-M	TRANSFORMER VAULT
11	16-M	MARINE CORPS EXCHANGE
12	16-M	TRAINING & CLASSROOM BUILDING
13	16-M	DISPENSARY
14	16-M	DENTAL CLINIC & GUARD OFFICE
15	16-M	PUBLIC WORKS SHOP
16	16-N	CRASH VEHICLE BUILDING
17	16-N	FUEL FARM
18		
19	16-M	VMO-1 ADMINISTRATION BUILDING
20	16-N	MCAF & VMO-1 HANGER
21	17-M	MCAF TRANSPORTATION BUILDING
22	17-M	VMO-1 MOTOR TRANSPORT
23	18-N	BOAT DOCK
24	16-M	PUBLIC WORKS SHOP
25	16-M	PUBLIC WORKS OFFICE
*26	16-M	PUBLIC WORKS SHOP
*27	16-M	SPECIAL SERVICES BUILDING
28	16-M	COMMUNICATIONS WAREHOUSE
29	17-M	PUBLIC WORKS SHOP
30	17-M	VMO I WAREHOUSE
31	17-M	MACS-7 WAREHOUSE
32	17-M	MACS-7 MOTOR TRANSPORT & WAREHOUSE
33	16-L	MACS-7 RADAR BUILDING
34	16-L	" " "
35	16-L	" " "
36	16-L	MACS-7 RADAR TOWER
37	16-L	RADIO HOMING BEACON BUILDING
38	16-M	VMO MATERIAL BUILDING
*25A	16-M	NAVY CONSTRUCTION OFFICE
*26A	16-M	EQUIPMENT REPAIR SHOP

MAP OF

CAMP GEIGER-MCAF, NEW RIVER AND VICINITY

CAMP LEJEUNE, NORTH CAROLINA

SHOWING CONDITIONS ON

30 JUNE 1959

500 0 500 1000 1500 2000 2500

SCALE OF FEET

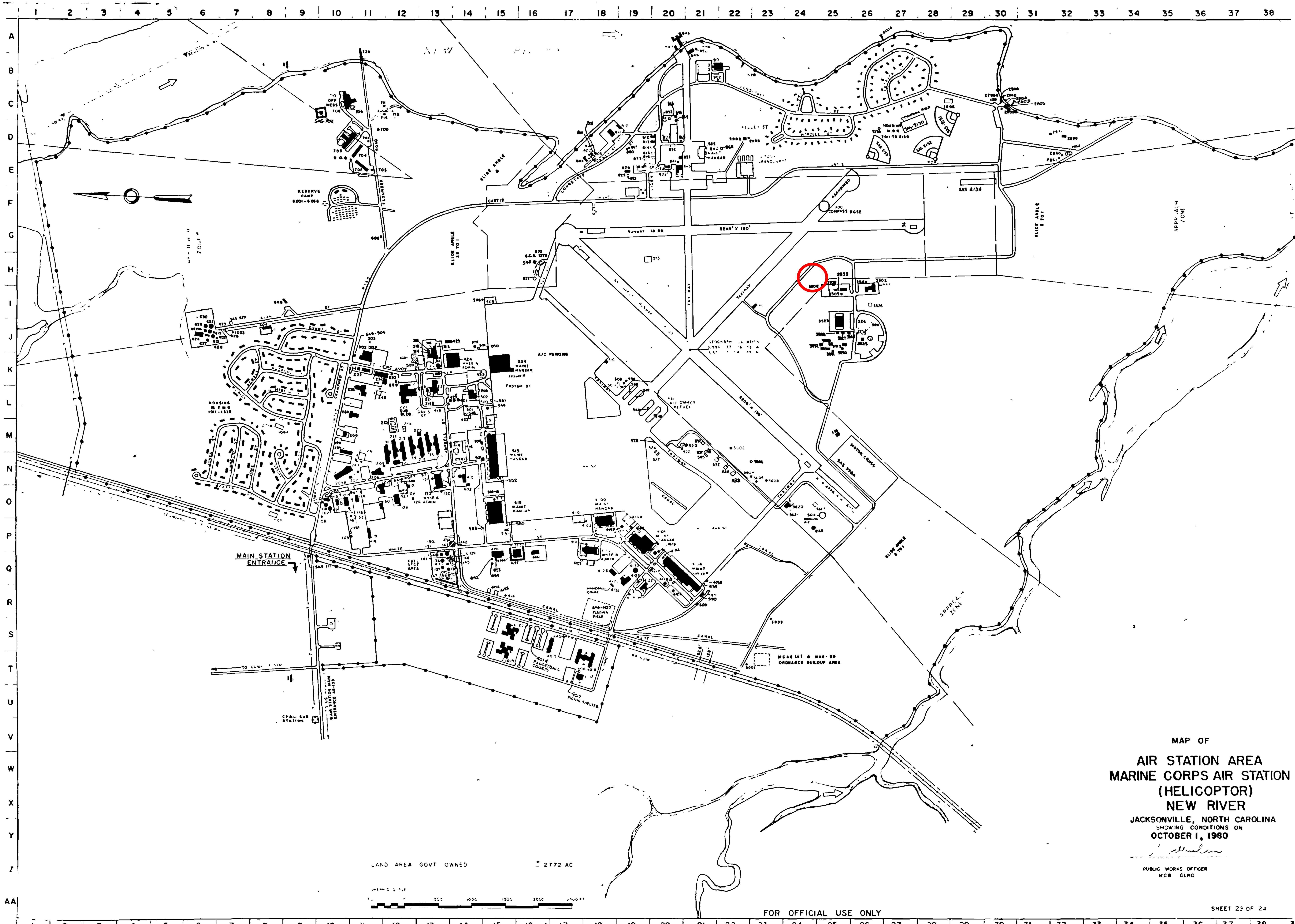
W. C. Harvey

COMMANDER (C.E.C.) U.S.N.
PUBLIC WORKS OFFICER
MCB CLNC

SHEET 7 OF 14

FOR LEGEND REFER TO SHEET 7-C

CAMP LEJEUNE, N.C.



MAIN STATION ENTRANCE
RESERVE CAMP
HOUSING
A/C PARKING
COMPASS ROSE
MOTOR CROSS
MCAS (H) & MAG-29 ORDNANCE BUILDUP AREA
BASKETBALL COURTS
PICNIC SHELTER
CANAL
LAND AREA GOVT OWNED ± 2772 AC
FOR OFFICIAL USE ONLY
MAP OF
AIR STATION AREA
MARINE CORPS AIR STATION
(HELICOPTOR)
NEW RIVER
JACKSONVILLE, NORTH CAROLINA
SHOWING CONDITIONS ON
OCTOBER 1, 1980
PUBLIC WORKS OFFICER
MCB CLNC
SHEET 23 OF 24


EASTMAN TOPOGRAPHIC SAFETY
EASTMAN TOPOGRAPHIC SAFETY
RMP-2-5-V-131
RMP-2-5-V-132

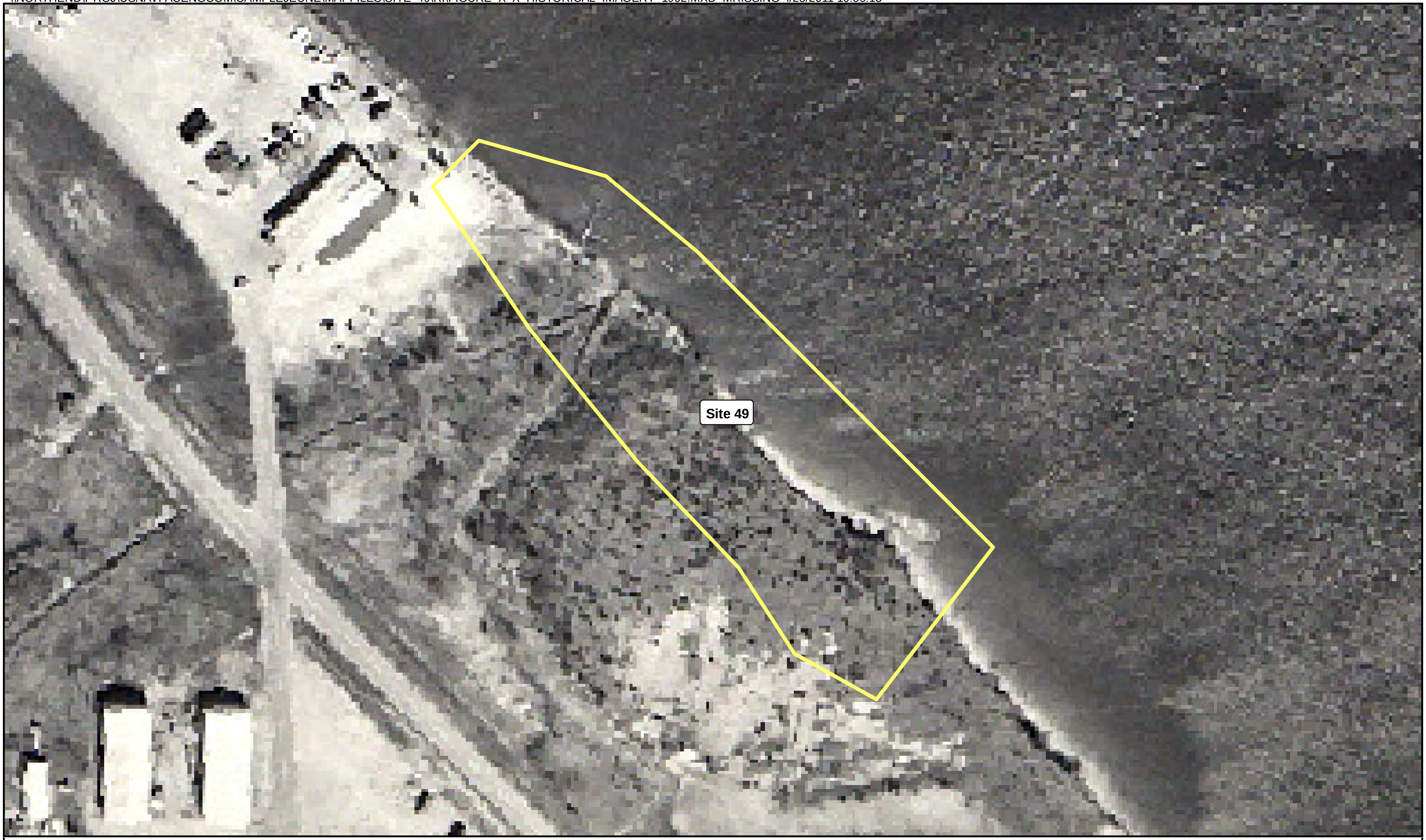
\\NORTHEND\PROJ\USNAVFACENGCOM\CAMPLEJEUNE\MAPFILES\SITE_49\RI\FIGURE_X_X_HISTORICAL_IMAGERY_1956.MXD MRISSING 4/25/2011 10:51:34

Figure X-X
Historical Imagery – 1956
Site 49 Remedial Investigation
MCB CamLej
North Carolina

CH2MHILL.


USN M 21
153.77MM
CA-14
LENS SER. NO.
DF3335
0,1,2,7
CAL. F.L.
153.77mm
USN M 21
153.77MM
CA-14
LENS SER. NO.
DF3335
0,1,2,6
CAL. F.L.
153.77mm

\\NORTHEND\PROJ\USNAVFACENGCOM\CAMPLEJEUNE\MAPFILES\SITE_49\RI\FIGURE_X_X_HISTORICAL_IMAGERY_1962.MXD MRISSING 4/25/2011 10:56:13



Legend

Site Boundary

N

0 62.5 125 250 Feet

1 inch = 125 feet

Figure X-X
Historical Imagery – 1962
Site 49 Remedial Investigation
MCB CamLej
North Carolina

CH2MHILL.


R-18 9APR64
CAL. F.L.
151.923mm
KC-1 (B)
LENS SER. NO.
611


GS-VDM
4-167
4-26-74

\\NORTHEND\PROJ\USNAVFACENGCOM\CAMPLEJEUNE\MAPFILES\SITE_49\RI\FIGURE_X_X_HISTORICAL_IMAGERY_1989.MXD MRISSING 4/25/2011 10:58:00

Legend

Site Boundary

N

0 62.5 125 250 Feet

1 inch = 125 feet

Figure X-X
Historical Imagery – 1989
Site 49 Remedial Investigation
MCB CamLej
North Carolina

CH2MHILL.

Appendix B
Boring Logs and Well Construction Records

	PROJECT NUMBER	BORING NUMBER	
CH2MHILL	411532.FI.FS	IR49-MW01	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : IR Site 49 Remedial Investigation — LOCATION: MCB CamLej, Jacksonville, North Carolina
ELEVATION : NA — DRILLING CONTRACTOR : Parratt Wolff-Hillsborough, North Carolina
DRILLING METHOD AND EQUIPMENT USED : CME 850X-4.25'' ID HAS-split spoon sampler driven by DPT hammer
WATER LEVELS : NA — START : 3-30-11 0820 — END : 3-30-11 0955 — LOGGER : R. Zajac/RDU

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: Depth (ft)	COMMENTS: PID Reading (PPM)
	0-4	4	HA	NA	Sandy clay (CL), orange and gray, moist, soft to medium soft, brick debris		
5	4-6	2	SS	NA	Clay (CL) tan to gray mottled, moist, stiff		0.1
10	9-11	NA	SS	NA	Clay (CL), tan, damp to moist, medium soft		
15	14-16	NA	SS	NA	14.5 Silty sand (SM) gray, saturated, loose, fine grained	MW-01 installed at 16 ft with 10 ft of sched. 40 PVC screen and 6 ft of sched. 40 PVC riser.	
					Boring terminated at 16 ft bgs		

PROJECT NUMBER	BORING NUMBER	
411532.FI.FS	IR49-MW01IW	SHEET 1 OF 2

SOIL BORING LOG

PROJECT : IR Site 49 Remedial Investigation | LOCATION: MCB CamLej, Jacksonville, North Carolina

ELEVATION : NA | DRILLING CONTRACTOR : Parratt Wolff-Hillsborough, North Carolina

DRILLING METHOD AND EQUIPMENT USED : 8-1/4" ID Hollow Stem Auger/DPT

WATER LEVELS : | START : 2-27-12 1100 | END : 2-28-12 1100 | LOGGER : K. Schrecengost/RDU

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: Depth (ft)	COMMENTS: PID Reading (PPM)
	0-4		HA	NA	0-4 Sandy clay (CL), orange and gray, moist, soft to medium soft, brick debris		
5	4-8	3.7	DPT	NA	4-8 Clay (CL), gray with orange mottled, hard, damp		1.1 0.5
10	8-12	4	DPT	NA	8-9.5 Silty Sand (SM) gray, moist, medium dense, orange mottled 9.5-11.5 Clay, CL, gray, orange, hard, medium plasticity 11.5 -12 Clayey Sand (SC) gray mottled with orange, moist, very fine sand, loose		1.6 1.4 0.7 0.6
15	12-16	3.5	DPT	NA	12.6-16 Silty Sand (SM) gray, damp, very fine to medium, loose		1.7 1.1
20	16-20	1	DPT	NA	16-19 No Recovery 19-20 Sand (SW) gray, damp, very fine to medium sand, medium dense		1.5
	20-24	1	DPT	NA	20-23.5 No Recovery 23.5 24.6 Sand (SW) dark gray, damp, very fine to coarse grained sand, loose		1.2
25	24-28	4	DPT	NA	24.5-27.5 Sand (SP) light gray, weakly cemented shelly sand, bivalves and gastropod casts, damp, loose, very fine to fine sand 27.5-28 Clayey Sand (SC) weakly cemented, light gray, damp, medium dense, very fine to fine sand		0.8 1.0

CH2MHILL

PROJECT NUMBER	BORING NUMBER
411532.FI.FS	IR49-MW01IW SHEET 2 OF 2

SOIL BORING LOG

PROJECT : IR Site 49 Remedial Investigation LOCATION: MCB CamLej, Jacksonville, North Carolina
ELEVATION : NA DRILLING CONTRACTOR : Parratt Wolff-Hillsborough, North Carolina
DRILLING METHOD AND EQUIPMENT USED : 8-1/4" ID Hollow Stem Auger/DPT
WATER LEVELS : START : 2-27-12 1100 END : 2-28-12 1100 LOGGER : K. Schrecengost/RDU

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: Depth (ft)	COMMENTS: PID Reading (PPM)
30	28-30	0	DPT	NA	28-30 No Recovery		0.7
	30-34	4	DPT	NA	30-34 Sand (SM) weakly cemented, gray, saturated, loose to medium dense, very fine to fine grained sand, shell fragments		0.0 0.0
35	34-38	4	DPT	NA	34-38 Sand (SM) weakly cemented, gray to light brown, moist, medium dense, very fine to fine sand and silt, thin sandy clay lenses		0.0 0.0
40	38-42	4	DPT	NA	38-41.5 Silty Sand (SM) weakly cemented, gray to light brown,wet, medium dense, very fine sand and silt, 1-inch diameter cemented clasts and shell fragments 41.5- 42 Silty Sand (SM) weakly cemented, gray/light brown, moist, medium dense/dense,		0.0 0.0
45	42-45	3	DPT	NA	42-45 Sand (SP) gray to brown, moist, medium dense, very fine to fine sand	42' - 45'	0.0 0.0

CH2MHILL	PROJECT NUMBER 411532.FI.FS	BORING NUMBER IR49-MW02	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : IR Site 49 Remedial Investigation
LOCATION: MCB CamLej, Jacksonville, North Carolina
ELEVATION :
DRILLING CONTRACTOR : Parratt Wolff-Hillsborough, North Carolina
DRILLING METHOD AND EQUIPMENT USED : CME 850X-4.25'' ID HSA-split spoon sampler driven by DPT
WATER LEVELS :
START : 3-31-11 1615
END : 3-31-11 1700
LOGGER : R. Zajac/RDU

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: Depth (ft)	PID Reading (PPM)
	0-4	NA	HA	NA	Silty sand (SM), tan, moist, loose, fine to medium grained 0.6-4 Clay (CL) tan with orange and gray mottling, moist, medium stiff, trace sand, wood debris at 2'		
5	4-6	2	SS	NA	Clay (CL), gray with orange mottling, moist, medium stiff with trace sand		0.0
10	9-11	2	SS	NA	Clay (CL), gray with orange mottling to green-gray at 10.5, wet, soft		0.0
15	14-16	2	SS	NA	Silty sand (SM) dark gray, wet, medium dense, fine grained	MW-02 installed at 16 ft with 10 ft of sched. 40 PVC screen and 6 ft of sched. 40 PVC riser.	
					Boring terminated at 16 ft bgs		

CH2MHILL

PROJECT NUMBER	BORING NUMBER		
411532.FI.FS	IR49-MW03	SHEET 1	OF 1

SOIL BORING LOG

PROJECT : IR Site 49 Remedial Investigation
LOCATION: MCB CamLej, Jacksonville, North Carolina
ELEVATION : NA
DRILLING CONTRACTOR : Parratt Wolff-Hillsborough, North Carolina
DRILLING METHOD AND EQUIPMENT USED : CME 850X-4.25'' ID HAS-split spoon sampler driven by DPT
WATER LEVELS : NA
START : 3-30-11 1500
END : 3-30-11 1700
LOGGER : R. Zajac/RDU

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: Depth (ft)	PID Reading (PPM)
	0-4	NA	HA	NA	0-0.3 Asphalt 0.3-2 Silty sand (SM), tan, moist, loose, with some gravel 2-4 Clay (CL) tan to gray mottled, moist to wet, medium soft, with trace sand		
5	4-6	2	SS	NA	4-6 Clay (CL), tan gray and orange mottled, moist, stiff		
10	9-11	1	SS	NA	9-11 Clay (CL), tan gray mottled, wet, stiff with sand lense at 10.8'		
15	14-16	2	SS	NA	14-16 Silty sand (SM) dark brown, saturated, dense, trace clay, fine grained, coarse grained sand at 15.5'	MW-03 installed at 16 ft with 10 ft of sched. 40 PVC screen and 6 ft of sched. 40 PVC riser.	
					Boring terminated at 16 ft bgs		

CH2MHILL

PROJECT NUMBER	BORING NUMBER	
411532.FI.FS	IR49-MW04	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : IR Site 49 Remedial Investigation — LOCATION: MCB CamLej, Jacksonville, North Carolina
ELEVATION : NA — DRILLING CONTRACTOR : Parratt Wolff-Hillsborough, North Carolina
DRILLING METHOD AND EQUIPMENT USED : CME 850X-4.25'' ID HSA-split spoon sampler driven by DPT
WATER LEVELS : NA — START : 3-30-11 1230 — END : 3-30-11 1423 — LOGGER : R. Zajac/RDU

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: Depth (ft)	COMMENTS: PID Reading (PPM)
	0-4	NA	HA	NA	0-1.3 Silty sand (SM), beige, dry, loose, poorly graded with shell and limestone fragments 1.3-2.5 Silty sand (SM) brown, moist, medium dense, fine grained 2.5-4 Sandy Clay (CL) tan to gray orange mottled, moist, stiff		
5	4-6	2	SS	NA	4-6 Clay (CL), tan gray mottled, wet, very stiff		0.0
10	9-11	2	SS	NA	9-10.2 Clay (CL), dark gray, saturated, very soft with sand lense at 9.5' 10.2-11 Sandy clay (CL) dark brown, saturated, very soft		
15	14-16	1.3	SS	NA	14-16 Silty sand (SM) light gray, saturated, dense, very fine grained	MW-04 installed at 16 ft with 10 ft of sched. 40 PVC screen and 6 ft of sched. 40 PVC riser.	
					Boring terminated at 16 ft bgs		

PROJECT NUMBER	BORING NUMBER	
411532.FI.FS	IR49-MW05	SHEET 1 OF 1

CH2MHILL

SOIL BORING LOG

PROJECT : IR Site 49 Remedial Investigation
LOCATION: MCB CamLej, Jacksonville, North Carolina
ELEVATION : NA
DRILLING CONTRACTOR : Parratt Wolff-Hillsborough, North Carolina
DRILLING METHOD AND EQUIPMENT USED : CME 850X-4.25'' ID HSA-split spoon sampler driven by DPT
WATER LEVELS : NA
START : 3-31-11 1030
END : 3-31-11 1150
LOGGER : R. Zajac/RDU

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: Depth (ft)	PID Reading (PPM)
	0-4	NA	HA	NA	0-2 Silty sand (SM), light brown 2-3 Clayey sand (SC), tan, wet, loose 3-4 Clay (CL), dark brown, wet, saturated, stiff		
5	4-6	NA	SS	NA	4-6 Clay (CL), tan gray mottled, wet, medium soft to stiff, with some tree debris, stiffness increases with depth		0.0
10	9-11	NA	SS	NA	9-11 Clay (CL), tan and gray mottled to dark gray green, wet, soft		0.0
15	14-16	NA	SS	NA	14-15.2 Clay (CL) gray and tan mottled, saturated, very stiff 15.2-16 Silty sand (SM) dark gray, saturated, loose, medium to fine grained	MW-05 installed at 16 ft with 10 ft of sched. 40 PVC screen and 6 ft of sched. 40 PVC riser.	
					Boring terminated at 16 ft bgs		

PROJECT NUMBER	BORING NUMBER	
411532.FI.FS	IR49-MW06	SHEET 1 OF 1

CH2MHILL

SOIL BORING LOG

PROJECT : IR Site 49 Remedial Investigation
LOCATION: MCB CamLej, Jacksonville, North Carolina
ELEVATION : NA
DRILLING CONTRACTOR : Parratt Wolff-Hillsborough, North Carolina
DRILLING METHOD AND EQUIPMENT USED : CME 850X-4.25'' ID HSA-split spoon sampler driven by DPT
WATER LEVELS : NA
START : 3-29-11 1530
END : 3-29-11 1720
LOGGER : R. Zajac/RDU

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: Depth (ft)	COMMENTS: PID Reading (PPM)
	0-4	NA	HA	NA	0-2.5 Silty sand (SM), tan and orange, moist, loose, coarse grained 2.5-3 Sandy clay (CL) dark brown, moist to wet, soft 3-4 Clay (CL) dark gray, wet, soft with organic material, sand lense at 3.5		
5	4-6	0.3	SS	NA	4-6 Sandy clay (CL), dark brown, saturated, very soft with organic debris		0.0
10	9-11	2	SS	NA	9-11 Clay (CL), gray tan mottled, wet, medium stiff		0.0
15	14-16	NA	SS	NA	14-15 Clayey Sand (SC) 15-16 Sand (SP) trace clay	MW-06 installed at 16 ft with 10 ft of sched. 40 PVC screen and 6 ft of sched. 40 PVC riser.	
					Boring terminated at 16 ft bgs		

PROJECT NUMBER	BORING NUMBER	
411532.FI.FS	IR49-MW08	SHEET 1 OF 1

SOIL BORING LOG

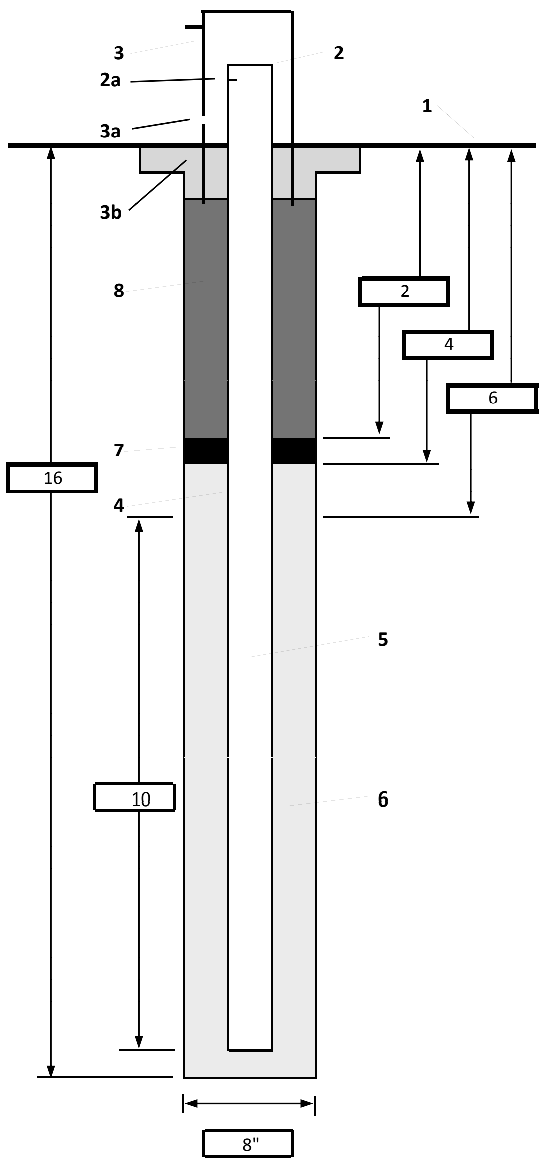
PROJECT : IR Site 49 Remedial Investigation — LOCATION: MCB CamLej, Jacksonville, North Carolina
ELEVATION : NA — DRILLING CONTRACTOR : Parratt Wolff-Hillsborough, North Carolina
DRILLING METHOD AND EQUIPMENT USED : CME 850X-4.25'' ID HSA-split spoon sampler driven by DPT
WATER LEVELS : — START : 3-28-11 1345 — END : 3-31-11 1200 — LOGGER : R. Zajac/RDU

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: Depth (ft)	COMMENTS: PID Reading (PPM)
	0-4	NA	HA	NA	0-1.5 Sand (SP), tan, moist, loose, coarse grained 1.5-2.5 Clay (CL), dark brown, wet with gravel and organic material 2.5-4 Clay (CL) gray to tan, saturated, stiff		2.5
5	4-6	1	SS	NA	Clay (CL), gray and tan, saturated, stiff with thin sandy lense at 6'		0.0
	8-10	NA	SS	NA	Clay (CL), gray tan, wet, stiff with thin sand lense at 9.5'		
10	10-12	NA	SS	NA	Clay (CL), light gray to dark gray green, saturated, soft, stiffness increases with depth		0.0
	13-15	NA	SS	NA	Clay (CL), dark gray green, saturated, medium soft with small sand lense at 14.5'		
15	15-17	NA	SS	NA	Clay (CL), dark gray green, saturated, soft		
	18-20	NA	SS	NA	18-19.5 Sand (SP) light brown, saturated, dense 19.5-20 Silty sand(SM) gray brown, saturated, medium dense with shell fragments		
20	20-22	1	SS	NA	20-21 Sand (SW) gray, loose, coarse grained with some fines 21-22 Silty sand (SM), gray, saturated, weakly cemented with abundant shell fragments		
30	30-32	2	SS	NA	30-32 Silty sand (SM) gray, saturated, weakly cemented with abundant shell fragments		
35	35-37	2	SS	NA	As above		0.0
40	40-42	2	SS	NA	40-42 Silty sand (SM) light brown, saturated, medium dense, fine grained with sparse shell fragments		

PROJECT NUMBER	WELL NUMBER		
411532	IR49-MW01	SHEET 1	OF 1

WELL COMPLETION DIAGRAM

PROJECT : Site 49 Remedial Investigation LOCATION : MCB CamLej, North Carolina
DRILLING CONTRACTOR : Parratt Wolff Inc
DRILLING METHOD AND EQUIPMENT USED : CME850X 4.25" ID Hollow Stem Auger
WATER LEVELS : START : 3/30/11 0820 END : 1015 LOGGER : R. Zajac/RDU



1- Ground elevation	3.60 ft amsl
2- Top of casing elevation	6.45 ft amsl
a) vent hole?	NA
3- Wellhead protection cover type	Stick-up
a) concrete pad dimensions	2' X 2'
4- Dia./type of well casing	2" ID Schedule 40 PVC
5- Type/slot size of screen	2" ID 0.010" machine slotted Schedule 40 PVC
6- Type screen filter	#1 Sand
a) Quantity used	6-50lb bags
7- Type of seal	3/8" Bentonite Chips
a) Quantity used	3/4-45lb bag
8- Grout	
a) Grout mix used	Portland cement/bentonite
b) Method of placement	Tremie
c) Vol. of well casing grout	~5 gallons
Development method	Surge and Pump
Development time	1 hour

CH2MHILL	PROJECT NUMBER 411532	WELL NUMBER IR49-MW01IW	SHEET 1 OF 1

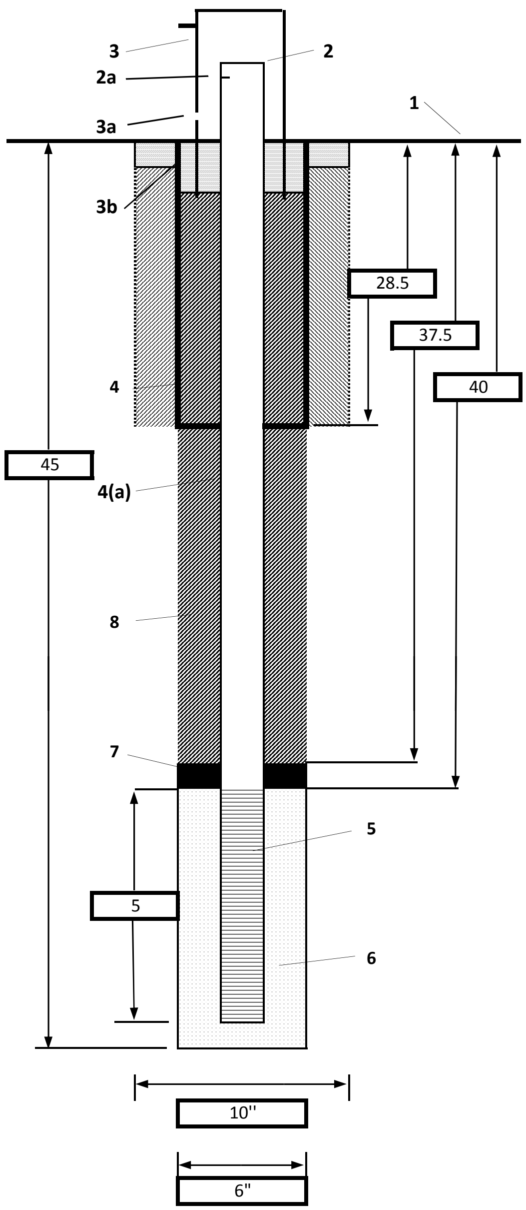
WELL COMPLETION DIAGRAM

PROJECT : Site 49 Remedial Investigation LOCATION : MCB CamLej, North Carolina

DRILLING CONTRACTOR : Parratt Wolff Inc

DRILLING METHOD AND EQUIPMENT USED : CME850X 8.25" ID Hollow Stem Auger and 5.875'' Mud Rotary

WATER LEVELS : START : 2/27/2012 1240 END : LOGGER : K. Schrecengost/RDU

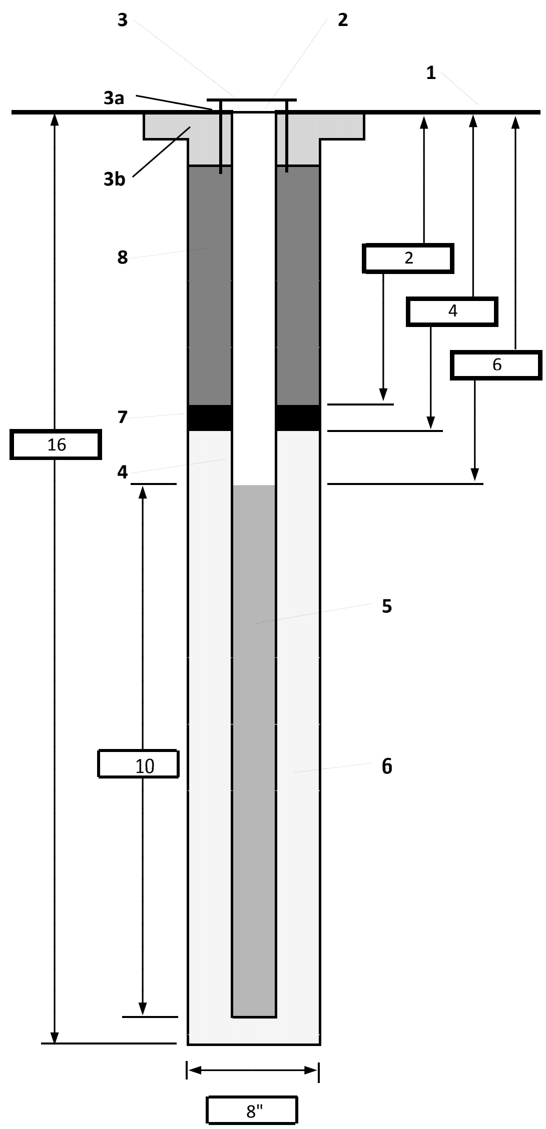


1- Ground elevation at well	NA
2- Top of casing elevation	NA
a) vent hole?	NA
3- Wellhead protection cover type	Stick-up
b) concrete pad dimensions	24" diameter
4- Dia./Type of Surface Casing	6" ID Steel Pipe (0-22 feet bgs)
a) Dia./Type of	2" ID Schedule 40 PVC
5- Type/slot size of screen	2" ID 0.010" machine slotted
	Schedule 40 PVC
6- Type screen filter	#1 Sand
a) Quantity used	6 bags
7- Type of seal	3/8" Bentonite Chips
a) Quantity used	3/4 bag
8- Grout	
a) Grout mix used	Portland cement/bentonite
b) Method of placement	Tremie
c) Vol. of well casing grout	~100 gallons
Development method	Surge and Pump
Development time	60 minutes

CH2MHILL	PROJECT NUMBER 411532	WELL NUMBER IR49-MW02 SHEET 1 OF 1

WELL COMPLETION DIAGRAM

PROJECT : Site 49 Remedial Investigation LOCATION : MCB CamLej, North Carolina
DRILLING CONTRACTOR : Parratt Wolff INC
DRILLING METHOD AND EQUIPMENT USED : CME850X 4.25" ID Hollow Stem Auger
WATER LEVELS : START : 3/31/11, 1615 END : 1645 LOGGER : R. Zajac/RDU

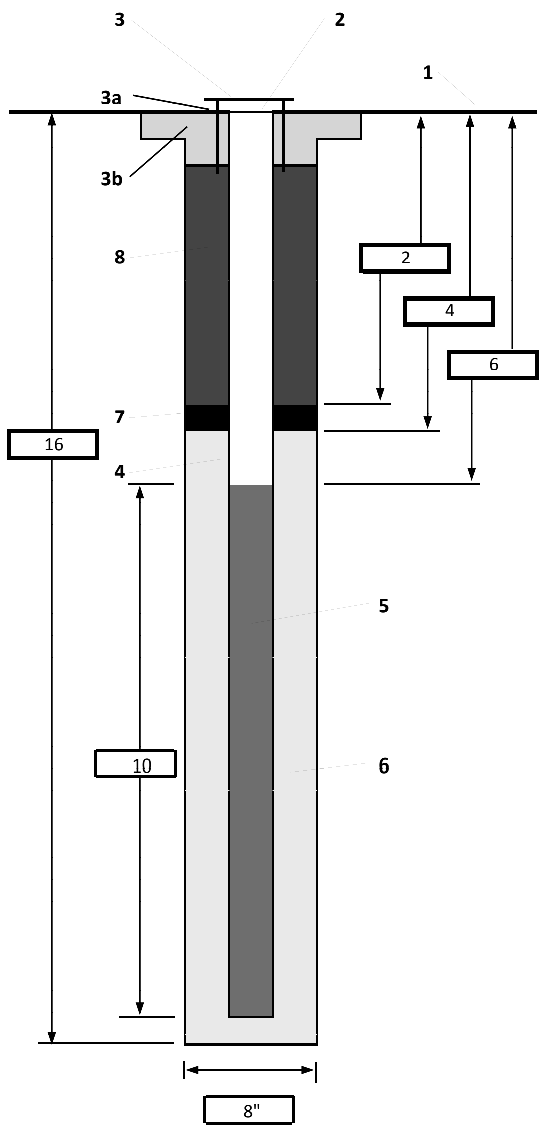


1- Ground elevation at well	4.61 ft amsl
2- Top of casing elevation	4.35 ft amsl
3- Wellhead protection cover type	Flush Mount
b) concrete pad dimensions	2' X 2'
4- Dia./type of well casing	2" ID Schedule 40 PVC
5- Type/slot size of screen	2" ID 0.010" machine slotted
	Schedule 40 PVC
6- Type screen filter	#1 Sand
a) Quantity used	8 bags
7- Type of seal	3/8" Bentonite Chips
a) Quantity used	3/4 bags
8- Grout	
a) Grout mix used	Portland cement/bentonite
b) Method of placement	Tremie
c) Vol. of well casing grout	~5 gallons
Development method	Surge and Pump
Development time	1.5 hours

PROJECT NUMBER	WELL NUMBER	
411532	IR49-MW03	SHEET 1 OF 1

WELL COMPLETION DIAGRAM

PROJECT : Site 49 Remedial Investigation	LOCATION : MCB CamLej, North Carolina
DRILLING CONTRACTOR : Parratt Wolff INC	
DRILLING METHOD AND EQUIPMENT USED : CME850X 4.25" ID Hollow Stem Auger	
WATER LEVELS : START : 3/30/11 1515	END : 1600 LOGGER : R. Zajac/RDU

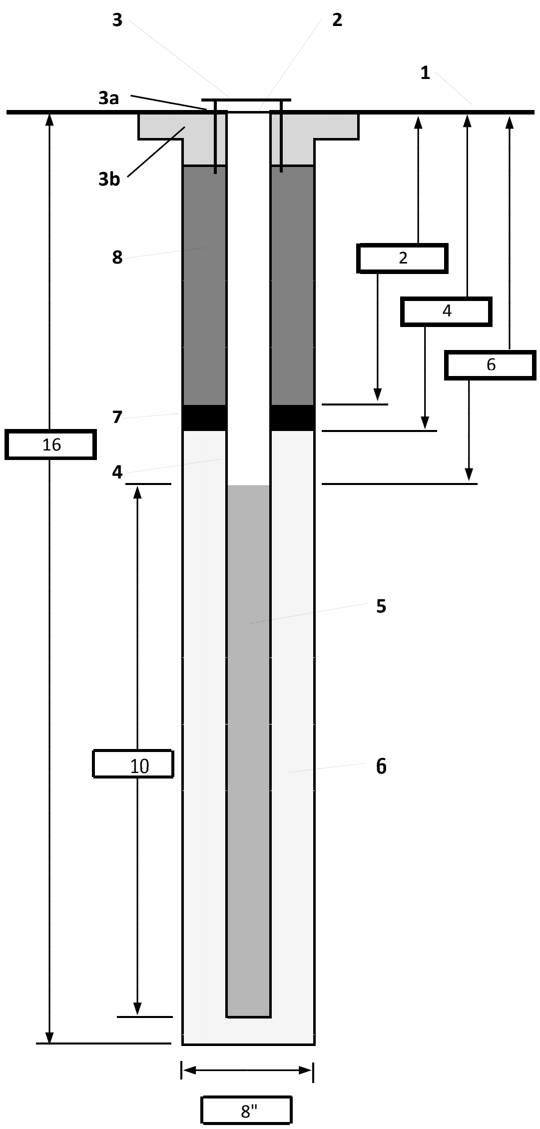


1- Ground elevation at well	7.11 ft amsl
2- Top of casing elevation	6.75 ft amsl
3- Wellhead protection cover type	Flush Mount
a) concrete pad dimensions	24" diameter
4- Dia./type of well casing	2" ID Schedule 40 PVC
5- Type/slot size of screen	2" ID 0.010" machine slotted Schedule 40 PVC
6- Type screen filter	#1 Sand
a) Quantity used	7 bags
7- Type of seal	3/8" Bentonite Chips
a) Quantity used	1 bag
8- Grout	
a) Grout mix used	Portland cement/bentonite
b) Method of placement	Tremie
c) Vol. of well casing grout	~5 gallons
Development method	Surge and Pump
Development time	2.5 hrs

PROJECT NUMBER	WELL NUMBER	
411532	IR49-MW04	SHEET 1 OF 1

WELL COMPLETION DIAGRAM

PROJECT : Site 49 Remedial Investigation LOCATION : MCB CamLej, North Carolina
DRILLING CONTRACTOR : Parratt Wolff INC
DRILLING METHOD AND EQUIPMENT USED : CME850X 4.25" ID Hollow Stem Auger
WATER LEVELS : START : 3/30/11 1255 END : 1425 LOGGER : R. Zajac/RDU



1- Ground elevation at well	4.95 ft amsl
2- Top of casing elevation	4.78 ft amsl
3- Wellhead protection cover type	Flush Mount
b) concrete pad dimensions	24" diameter
4- Dia./type of well casing	2" ID Schedule 40 PVC
5- Type/slot size of screen	2" ID 0.010" machine slotted
	Schedule 40 PVC
6- Type screen filter	#1 Sand
a) Quantity used	7 bags
7- Type of seal	3/8" Bentonite Chips
a) Quantity used	1 bag
8- Grout	
a) Grout mix used	Portland cement/bentonite
b) Method of placement	Tremie
c) Vol. of well casing grout	~5 gallons
Development method	Surge and Pump
Development time	0.5 hrs

PROJECT NUMBER	WELL NUMBER	
411532	IR49-MW05	SHEET 1 OF 1

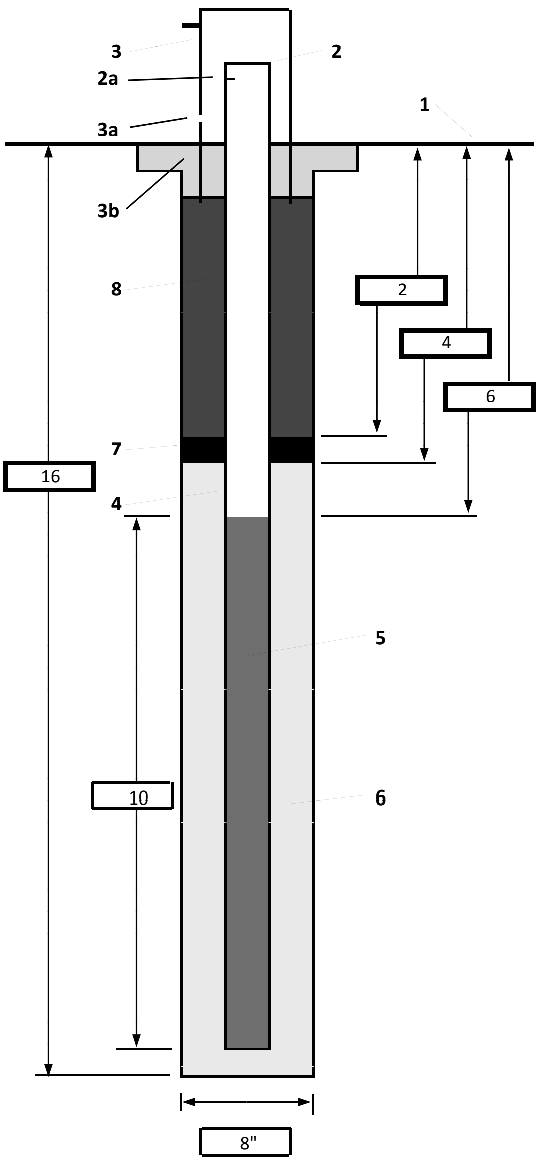
WELL COMPLETION DIAGRAM

PROJECT : Site 49 Remedial Investigation LOCATION : MCB CamLej, North Carolina

DRILLING CONTRACTOR : Parratt Wolff Inc

DRILLING METHOD AND EQUIPMENT USED : CME850X 4.25" ID Hollow Stem Auger

WATER LEVELS : START : 3/30/11 1030 END : 1050 LOGGER : R. Zajac/RDU



1- Ground elevation at well	2.56 ft amsl
2- Top of casing elevation	5.71 ft amsl
a) vent hole?	NA
3- Wellhead protection cover type	Stick-up
b) concrete pad dimensions	24" diameter
4- Dia./type of well casing	2" ID Schedule 40 PVC
5- Type/slot size of screen	2" ID 0.010" machine slotted
	Schedule 40 PVC
6- Type screen filter	#1 Sand
a) Quantity used	7 bags
7- Type of seal	3/8" Bentonite Chips
a) Quantity used	3/4 bag
8- Grout	
a) Grout mix used	Portland cement/bentonite
b) Method of placement	Tremie
c) Vol. of well casing grout	~5 gallons
Development method	Surge and Pump
Development time	1 hour

PROJECT NUMBER	WELL NUMBER		
411532	IR49-MW06	SHEET 1	OF 1

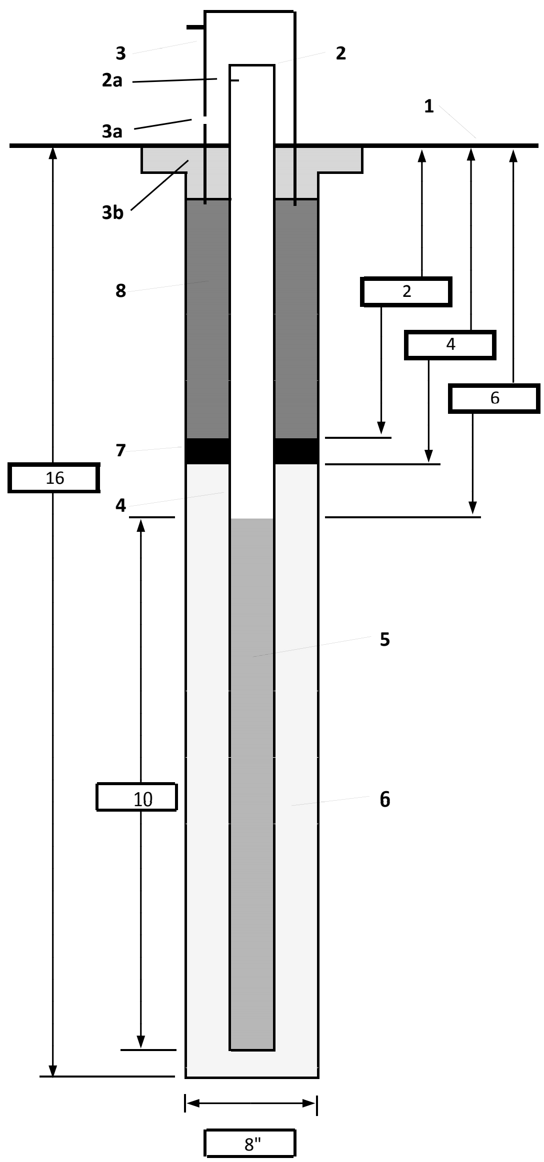
WELL COMPLETION DIAGRAM

PROJECT : Site 49 Remedial Investigation LOCATION : MCB CamLej, North Carolina

DRILLING CONTRACTOR : Parratt Wolff Inc

DRILLING METHOD AND EQUIPMENT USED : CME850X 4.25" ID Hollow Stem Auger

WATER LEVELS : START : 03/29/11 1530 END : 1620 LOGGER : R. Zajac/RDU



1- Ground elevation at well	1.811 ft amsl
2- Top of casing elevation	4.800 ft amsl
a) vent hole?	NA
3- Wellhead protection cover type	Stick-up
b) concrete pad dimensions	24" diameter
4- Dia./type of well casing	2" ID Schedule 40 PVC
5- Type/slot size of screen	2" ID 0.010" machine slotted Schedule 40 PVC
6- Type screen filter	#1 Sand
a) Quantity used	7 bags
7- Type of seal	3/8" Bentonite Chips
a) Quantity used	3/4 bag
8- Grout	
a) Grout mix used	Portland cement/bentonite
b) Method of placement	Tremie
c) Vol. of well casing grout	~5 gallons
Development method	Surge and Pump
Development time	45 mins

PROJECT NUMBER	WELL NUMBER	
411532	IR49-MW07	SHEET 1 OF 1

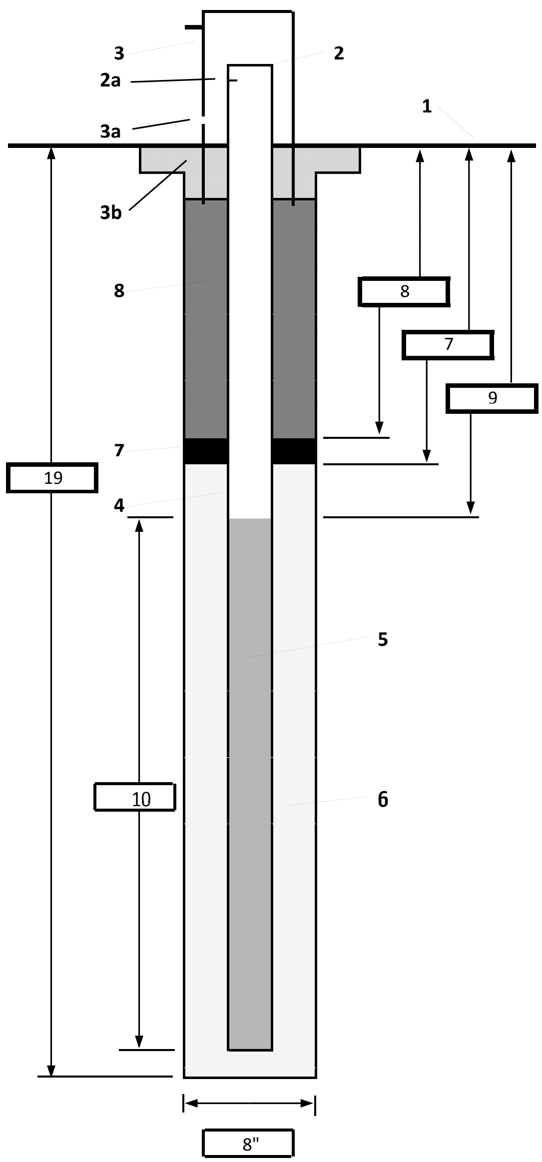
WELL COMPLETION DIAGRAM

PROJECT : Site 49 Remedial Investigation LOCATION : MCB CamLej, North Carolina

DRILLING CONTRACTOR : Parratt Wolff Inc

DRILLING METHOD AND EQUIPMENT USED : CME850X 4.25" ID Hollow Stem Auger

WATER LEVELS : START : 3/31/11 1320 END : 1430 LOGGER : R. Zajac/RDU



1- Ground elevation at well	2.740 ft amsl
2- Top of casing elevation	5.869 ft amsl
a) vent hole?	NA
3- Wellhead protection cover type	Stick-up
b) concrete pad dimensions	24" diameter
4- Dia./type of well casing	2" ID Schedule 40 PVC
5- Type/slot size of screen	2" ID 0.010" machine slotted Schedule 40 PVC
6- Type screen filter	#1 Sand
a) Quantity used	7 bags
7- Type of seal	3/8" Bentonite Chips
a) Quantity used	1 bag
8- Grout	
a) Grout mix used	Portland cement/bentonite
b) Method of placement	Tremie
c) Vol. of well casing grout	~5 gallons
Development method	Surge and Pump
Development time	0.5 hour

PROJECT NUMBER	WELL NUMBER
411532	IR49-MW08 SHEET 1 OF 1

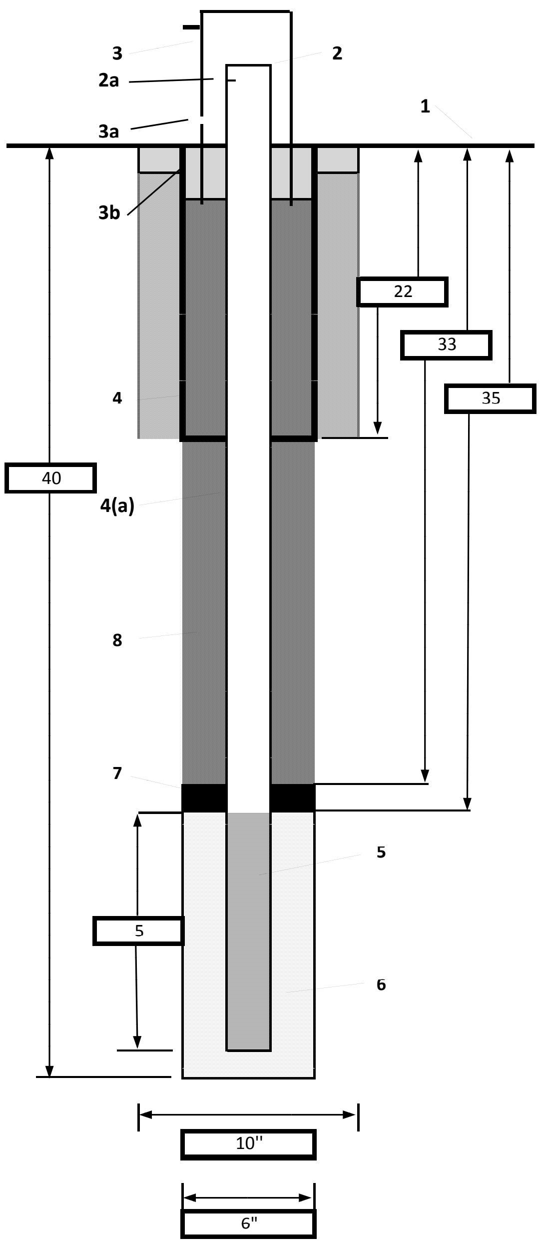
WELL COMPLETION DIAGRAM

PROJECT : Site 49 Remedial Investigation LOCATION : MCB CamLej, North Carolina

DRILLING CONTRACTOR : Parratt Wolff Inc

DRILLING METHOD AND EQUIPMENT USED : CME850X 4.25" ID Hollow Stem Auger and 5.875'' Mud Rotary

WATER LEVELS : START : 3/28/2011 0930 END : 3/30/2011 1100 LOGGER : R. Zajac/RDU



1- Ground elevation at well	2.87 ft amsl
2- Top of casing elevation	5.80 ft amsl
a) vent hole?	NA
3- Wellhead protection cover type	Stick-up
b) concrete pad dimensions	24" diameter
4- Dia./Type of Surface Casing	6" ID Steel Pipe (0-22 feet bgs)
a) Dia./Type of	2" ID Schedule 40 PVC
5- Type/slot size of screen	2" ID 0.010" machine slotted Schedule 40 PVC
6- Type screen filter	#1 Sand
a) Quantity used	6 bags
7- Type of seal	3/8" Bentonite Chips
a) Quantity used	3/4 bag
8- Grout	
a) Grout mix used	Portland cement/bentonite
b) Method of placement	Tremie
c) Vol. of well casing grout	~100 gallons
Development method	Surge and Pump
Development time	45 minutes

NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

CORRECTED

WELL CONTRACTOR CERTIFICATION # 2480

1. WELL CONTRACTOR:

Lewis LeFever
Well Contractor (Individual) Name

Parratt-Wolff, Inc.
Well Contractor Company Name

501 Millstone Drive
Street Address

Hillsborough — NC — 27278
City or Town — State — Zip Code

(919) 644-2814
Area code Phone number

2. WELL INFORMATION:

WELL CONSTRUCTION PERMIT#

OTHER ASSOCIATED PERMIT#(if applicable)

SITE WELL ID #(if applicable) MW-08

3. WELL USE (Check One Box) Monitoring ☑ Municipal/Public ☐ Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐ Irrigation☐ Other ☐ (list use)

DATE DRILLED 3/28-3/31/11

4. WELL LOCATION:

Longstaff Street
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)

CITY: Jacksonville COUNTY Onslow

TOPOGRAPHIC / LAND SETTING: (check appropriate box)
☐Slope ☐Valley ☑Flat ☐Ridge ☐Other

LATITUDE 34 ° 42 ' 642.0000 " DMS **OR** 3x.xxxxxxxxx DD

LONGITUDE 77 ° 25 ' 797.0000 " DMS **OR** 7x.xxxxxxxxx DD

Latitude/longitude source: ☑GPS ☐Topographic map
(location of well must be shown on a USGS topo map andattached to this form if not using GPS)

5. FACILITY (Name of the business where the well is located.)

MCB Camp Lejeune
Facility Name — Facility ID# (if applicable)

Longstaff Street
Street Address

Jacksonville — NC — 28542
City or Town — State — Zip Code

Contact Name

Mailing Address

City or Town — State — Zip Code

( )
Area code Phone number

6. WELL DETAILS:

a. **TOTAL DEPTH:** 40.0'

b. **DOES WELL REPLACE EXISTING WELL?** YES ☑ NO ☐

c. **WATER LEVEL** Below Top of Casing: 2.0 FT.
(Use "+" if Above Top of Casing)

d. **TOP OF CASING IS** 0 FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.

e. **YIELD (gpm):** N/A **METHOD OF TEST** N/A

f. **DISINFECTION: Type** N/A **Amount** N/A

g. **WATER ZONES** (depth):

Top	Bottom	Top	Bottom
N/A			

7. CASING:

Depth Top	Depth Bottom	Diameter	Thickness/ Weight	Material
0	22.0 Ft.	6"	Sch40	Steel
0	35.0 Ft.	2"	Sch40	PVC
	Ft.			

8. GROUT:

Depth Top	Depth Bottom	Material	Method
0	28.0 Ft.	Portland	Tremie
28.0	33.0 Ft.	Bentonite	Tremie
	Ft.		

9. SCREEN:

Depth Top	Depth Bottom	Diameter	Slot Size	Material
35.0	40.0 Ft.	2 in.	.010 in.	PVC
	Ft.	in.	in.	
	Ft.	in.	in.	

10. SAND/GRAVEL PACK:

Depth Top	Depth Bottom	Size	Material
33.0	40.0 Ft.	#1	Sand
	Ft.		
	Ft.		

11. DRILLING LOG

Top	Bottom	Formation Description
4.0	6.0'	Gray, wet, soft CLAY & SILT
15.0	17.0	Tan, wet, fine SAND; some silt
18.0	20.0	Tan, wet, fine SAND & SILT
20.0	22.0	White, wet, fine/coarse SAND; some silt
30.0	32.0	White, wet, fine/coarse SAND; some silt

12. REMARKS:

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

SIGNATURE OF CERTIFIED WELL CONTRACTOR — DATE 7-28-11

Lewis LeFever
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Submit within 30 days of completion to: Division of Water Quality - Information Processing, 1617 Mail Service Center, Raleigh, NC 27699-161, Phone : (919) 807-6300

Form GW-1b
Rev. 2/09

\\NORTHEND\PROJ\USNAVFACENGCOM\CAMPLEJEUNE\MAPFILES\SITE 49\UFP SAP\FIGURE 10-2 - GROUNDWATER SAMPLE LOCATIONS.MXD CBOWMAN 11/3/2010 15:44:09

Legend

- PA/SI Groundwater Sample (CH2M HILL, 2009)
- Proposed Deep Monitoring Well
- Proposed Shallow Monitoring Well/Subsurface Soil Sample Location
- Drainage Feature
- Site Boundary
- Buildings
- Jurisdictional Wetlands
- Direction of Groundwater Flow

N

0 50 100 200 Feet

1 inch = 100 feet

Figure 10-2
Groundwater and Subsurface Soil Sampling Locations
IR Site 49
Sampling and Analysis Plan
MCB CamLej
North Carolina

CH2MHILL

Generated by: K. Rogers/RDU Checked by: K. Howell/CLT

NON RESIDENTIAL WELL CONSTRUCTION RECORD

CORRECTED

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 2480

1. WELL CONTRACTOR:

Lewis LeFever
Well Contractor (Individual) Name

Parratt-Wolff, Inc.
Well Contractor Company Name

501 Millstone Drive
Street Address

Hillsborough — NC — 27278
City or Town — State — Zip Code

(919) 644-2814
Area code Phone number

2. WELL INFORMATION:

WELL CONSTRUCTION PERMIT#

OTHER ASSOCIATED PERMIT#(if applicable)

SITE WELL ID #(if applicable) MW-07

3. WELL USE (Check One Box) Monitoring ☑ Municipal/Public ☐ Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐ Irrigation ☐ Other ☐ (list use)

DATE DRILLED 3/31/11

4. WELL LOCATION:

Longstaff Street
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)

CITY: Jacksonville COUNTY Onslow

TOPOGRAPHIC / LAND SETTING: (check appropriate box)
☐Slope ☐Valley ☑Flat ☐Ridge ☐Other

LATITUDE 34 ° 42 ' 642.0000 " DMS OR 3X.XXXXXXXXX DD

LONGITUDE 77 ° 25 ' 797.0000 " DMS OR 7X.XXXXXXXXX DD

Latitude/longitude source: ☑GPS ☐Topographic map
(location of well must be shown on a USGS topo map andattached to this form if not using GPS)

5. FACILITY (Name of the business where the well is located.)

MCB Camp Lejeune
Facility Name — Facility ID# (if applicable)

Longstaff Street
Street Address

Jacksonville — NC — 28542
City or Town — State — Zip Code

Contact Name

Mailing Address

City or Town — State — Zip Code

( )
Area code Phone number

6. WELL DETAILS:

a. **TOTAL DEPTH:** 19.0'

b. **DOES WELL REPLACE EXISTING WELL?** YES ☑ NO ☐

c. **WATER LEVEL** Below Top of Casing: 2.0 FT.
(Use "+" if Above Top of Casing)

d. **TOP OF CASING IS** 0 FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.

e. **YIELD (gpm):** N/A **METHOD OF TEST** N/A

f. **DISINFECTION: Type** N/A **Amount** N/A

g. **WATER ZONES** (depth):

Top	Bottom	Top	Bottom
N/A			

7. CASING:

Depth Top	Bottom	Diameter	Thickness/ Weight	Material
0	9.0 Ft.	2"	Sch40	PVC
	Ft.			
	Ft.			

8. GROUT:

Depth Top	Bottom	Material	Method
0	4.0 Ft.	Portland	Tremie
4.0	7.0 Ft.	Bentonite	Tremie
	Ft.		

9. SCREEN:

Depth Top	Bottom	Diameter	Slot Size	Material
9.0	19.0 Ft.	2 in.	.010 in.	PVC
	Ft.	in.	in.	
	Ft.	in.	in.	

10. SAND/GRAVEL PACK:

Depth Top	Bottom	Size	Material
7.0	19.0 Ft.	#1	Sand
	Ft.		
	Ft.		

11. DRILLING LOG

Top	Bottom	Formation Description
/		No samples taken

12. REMARKS:

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

[signature] 7-28-11
SIGNATURE OF CERTIFIED WELL CONTRACTOR — DATE

Lewis LeFever
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Submit within 30 days of completion to: Division of Water Quality - Information Processing, 1617 Mail Service Center, Raleigh, NC 27699-161, Phone : (919) 807-6300

Form GW-1b
Rev. 2/09

Legend

- PA/SI Groundwater Sample (CH2M HILL, 2009)
- Proposed Deep Monitoring Well
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- Jurisdictional Wetlands
- Direction of Groundwater Flow

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0 50 100 200 Feet

1 inch = 100 feet

Figure 10-2
Groundwater and Subsurface Soil Sampling Locations
IR Site 49
Sampling and Analysis Plan
MCB CamLej
North Carolina

CH2MHILL

Generated by: K. Rogers/RDU Checked by: K. Howell/CLT

Appendix C
Survey Report

LANIER
SURVEYING COMPANY

134 Cedar Point Boulevard
Cedar Point NC, 28584

Date: 4-15-2011
Reference: Expanded Site Inspection
Site 49
MCB Camp Lejeune, North Carolina

Horizontal Datum: UTM ZONE 18 NORTH NAD 83 (NSRS 2007) METERS
Control Reference: NC CORS NETWORK

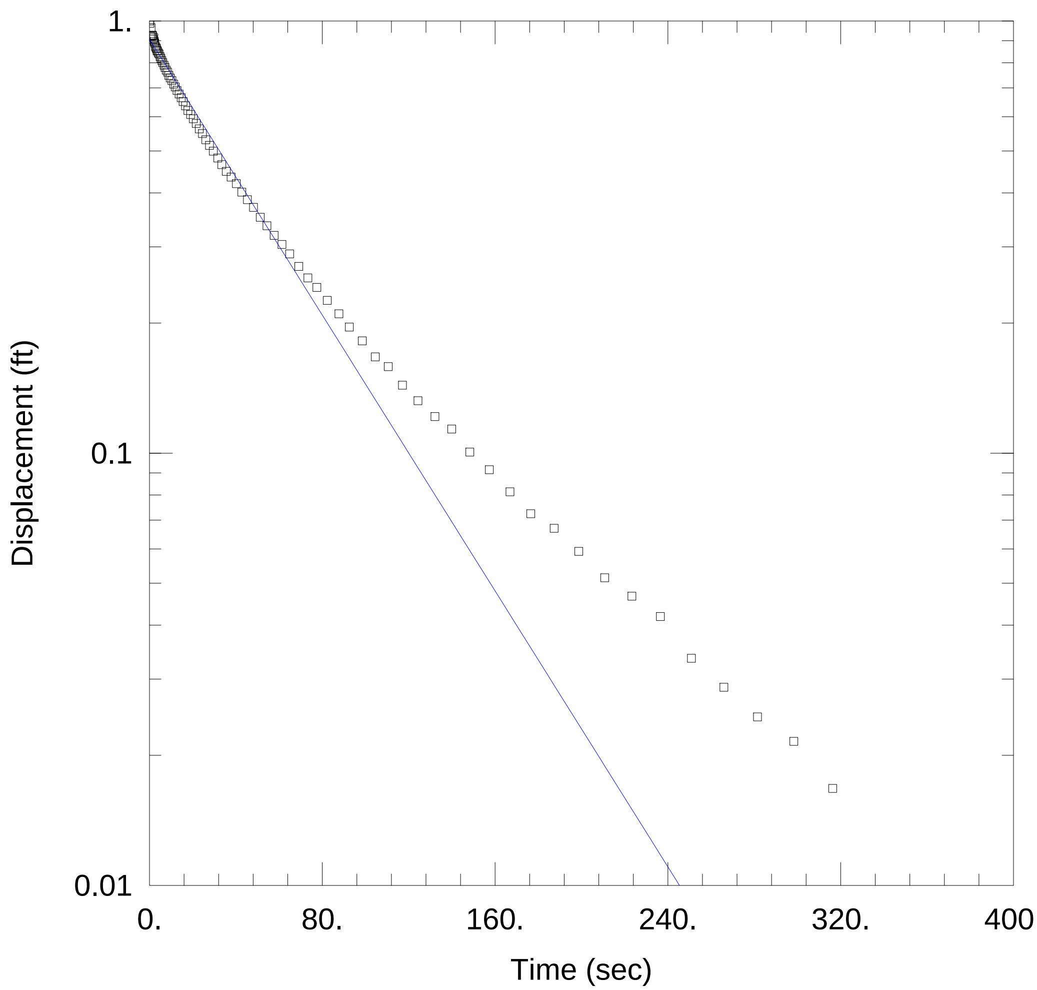
Vertical Datum: NAVD 88 METERS

POINT DESCRIPTION	NORTHING	EASTING	PVC	GROUND
IR49-MW03	3843862.667	277331.154	2.060	2.17
IR49-MW04	3843843.975	277341.295	1.457	1.509
IR49-MW02	3843843.488	277356.500	1.326	1.405
IR49-MW01	3843836.028	277369.268	1.966	1.1
IR49-MW06	3843820.378	277375.012	1.463	0.552
IR49-MW07	3843830.434	277361.297	1.789	0.835
IR49-MW08	3843829.379	277360.283	1.768	0.875
IR49-MW05	3843818.677	277350.541	1.743	0.783

NORTH CAROLINA PROFESSIONAL SEAL L-3611 LAND SURVEYOR BRENT A. LANIER

Brent A. Lanier
4/18/11

Appendix D
Slug Test Results



WELL TEST ANALYSIS

Data Set: C:\Users\JAlbano\Documents\49\Site 49 May 2011 Slug Testing\MW1-1.aqt
Date: 02/09/12 Time: 15:15:35

PROJECT INFORMATION

Company: CH2M HILL
Client: Navy
Location: MCB CamLej
Test Well: IR Site 49
Test Date: 5/5/11

AQUIFER DATA

Saturated Thickness: 100. ft Anisotropy Ratio (Kz/Kr): 1.

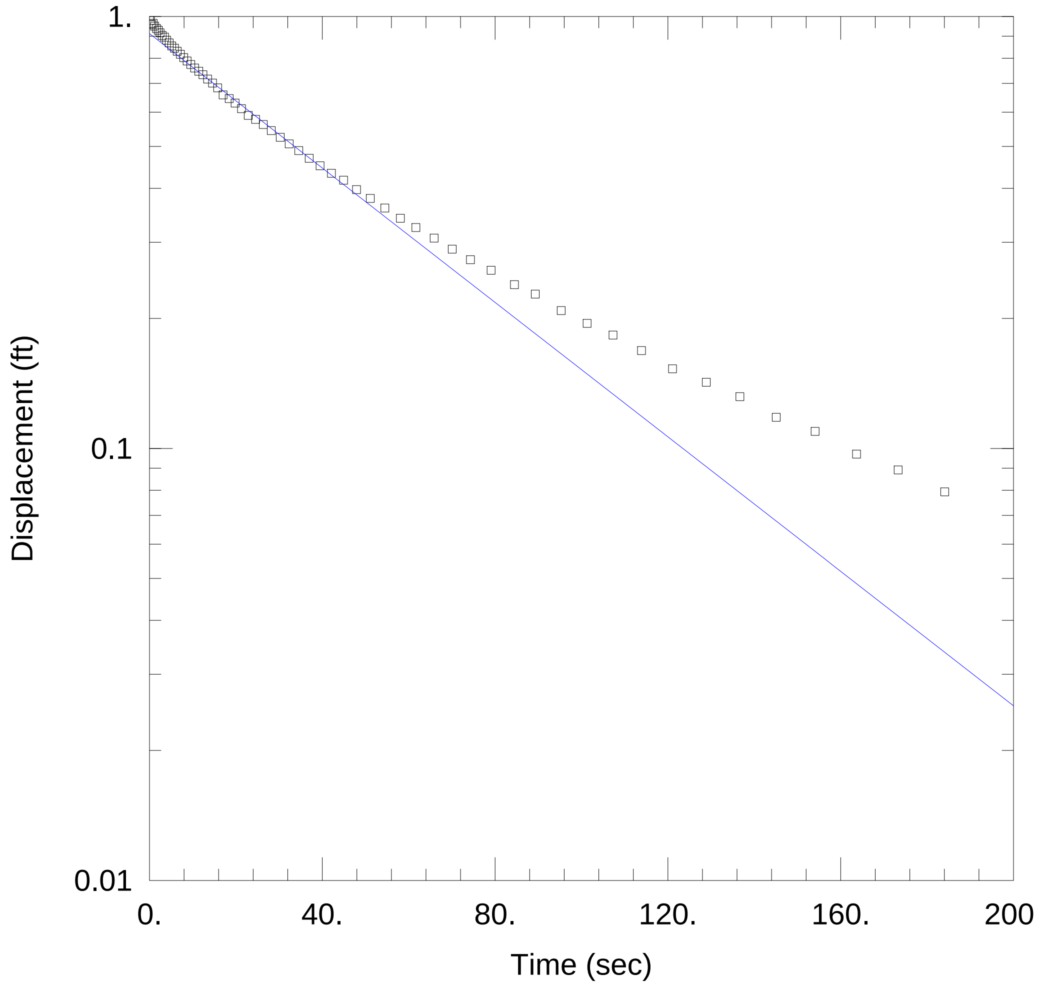
WELL DATA (MW1)

Initial Displacement: 1. ft
Total Well Penetration Depth: 13.2 ft
Casing Radius: 0.083 ft
Static Water Column Height: 13.2 ft
Screen Length: 10. ft
Well Radius: 0.33 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 1.208 ft/day y0 = 0.9073 ft



WELL TEST ANALYSIS

Data Set: C:\Users\JAlbano\Documents\49\Site 49 May 2011 Slug Testing\MW1-2.aqt
Date: 02/09/12 Time: 15:15:42

PROJECT INFORMATION

Company: CH2M HILL
Client: Navy
Location: MCB CamLej
Test Well: IR Site 49
Test Date: 5/5/11

AQUIFER DATA

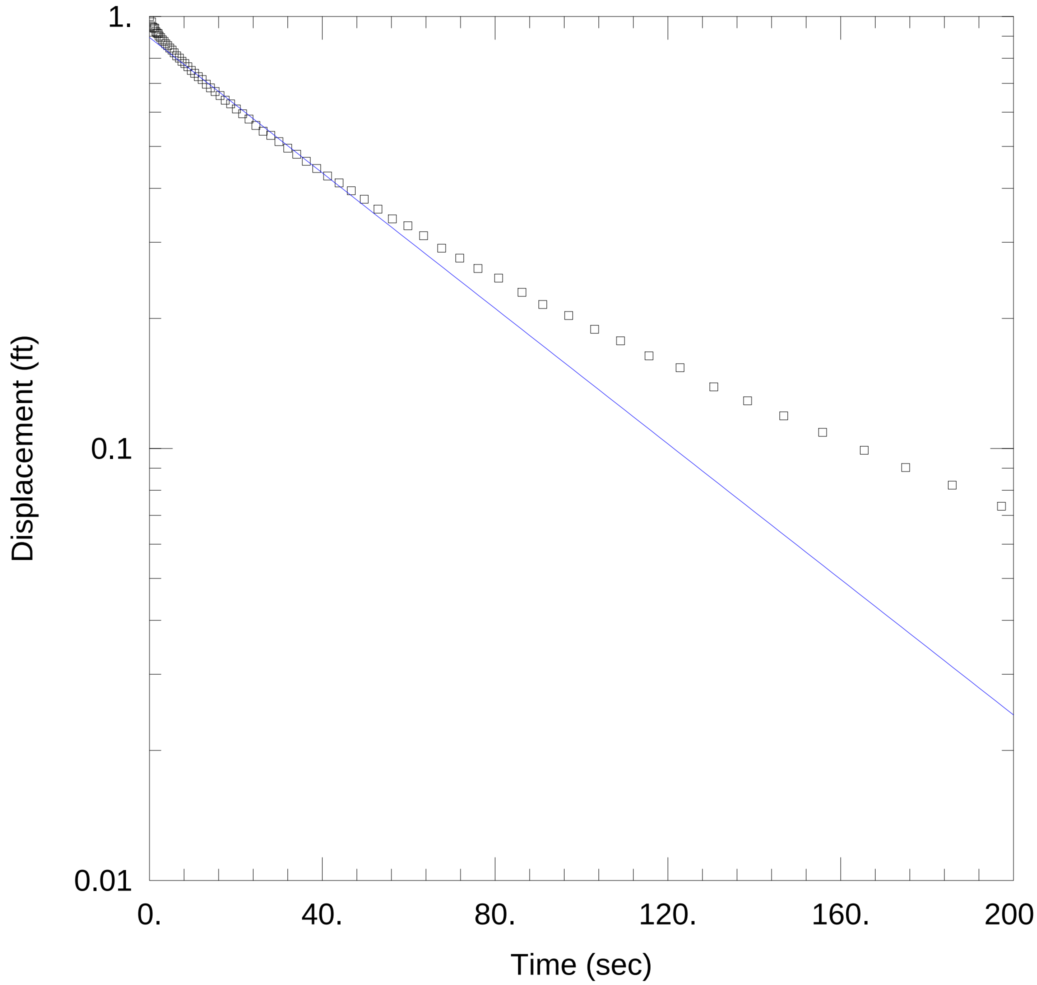
Saturated Thickness: 100. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW1)

Initial Displacement: 1. ft
Total Well Penetration Depth: 13.2 ft
Casing Radius: 0.083 ft
Static Water Column Height: 13.2 ft
Screen Length: 10. ft
Well Radius: 0.33 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.178 ft/day
y0 = 0.9125 ft



WELL TEST ANALYSIS

Data Set: C:\Users\JAlbano\Documents\49\Site 49 May 2011 Slug Testing\MW1-3.aqt
Date: 02/09/12 Time: 15:15:45

PROJECT INFORMATION

Company: CH2M HILL
Client: Navy
Location: MCB CamLej
Test Well: IR Site 49
Test Date: 5/5/11

AQUIFER DATA

Saturated Thickness: 100. ft Anisotropy Ratio (Kz/Kr): 1.

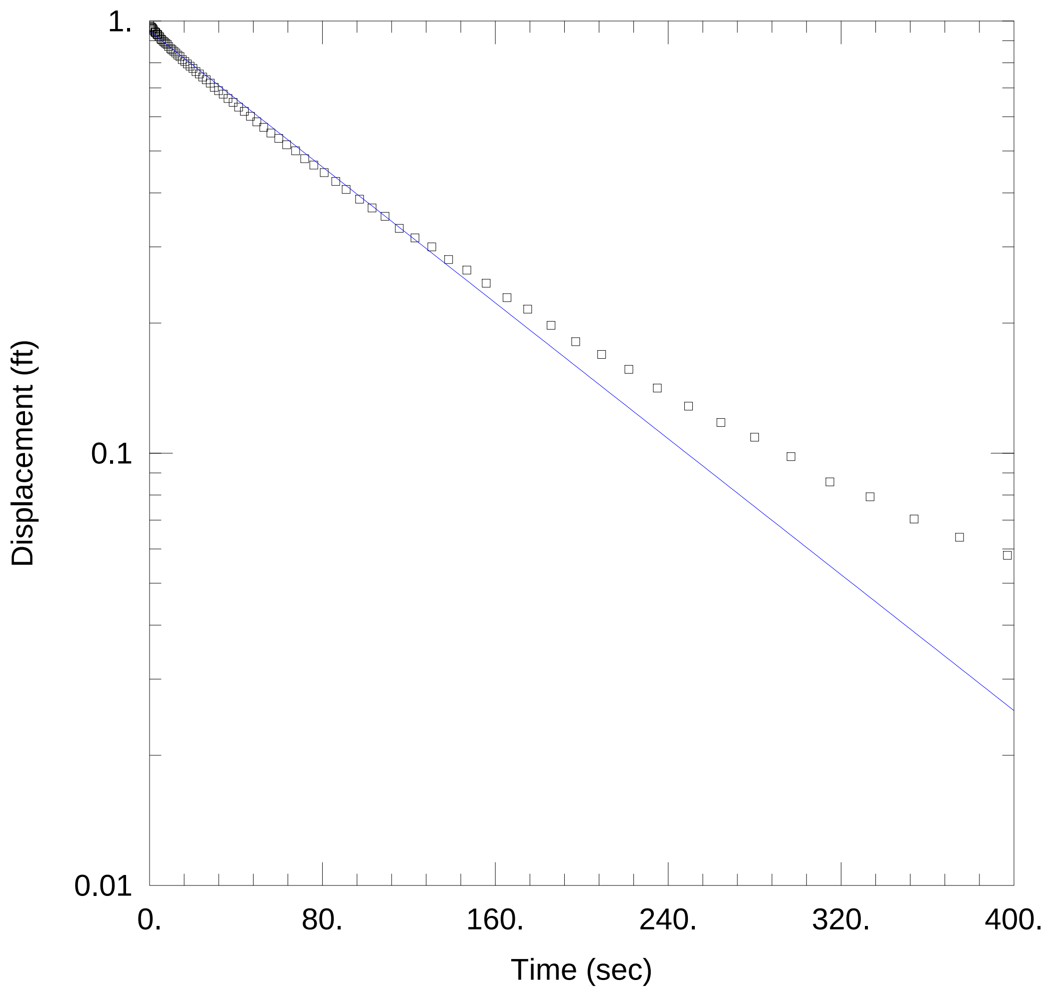
WELL DATA (MW1)

Initial Displacement: 1. ft
Total Well Penetration Depth: 13.2 ft
Casing Radius: 0.083 ft
Static Water Column Height: 13.2 ft
Screen Length: 10. ft
Well Radius: 0.33 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 1.187 ft/day y0 = 0.8942 ft



WELL TEST ANALYSIS

Data Set: C:\Users\JAlbano\Documents\49\Site 49 May 2011 Slug Testing\MW2-1.aqt
Date: 02/09/12 Time: 15:15:49

PROJECT INFORMATION

Company: CH2M HILL
Client: Navy
Location: MCB CamLej
Test Well: IR Site 49
Test Date: 5/5/11

AQUIFER DATA

Saturated Thickness: 100. ft Anisotropy Ratio (Kz/Kr): 1.

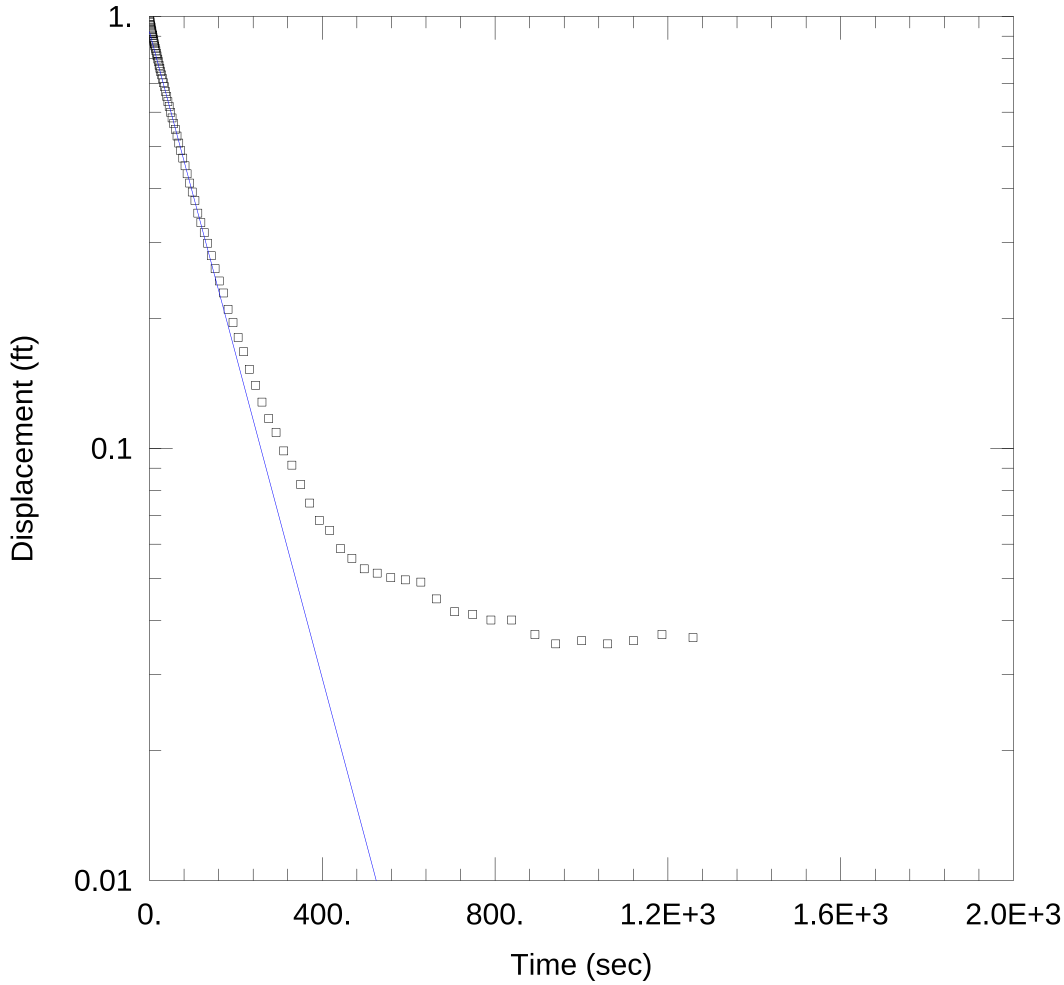
WELL DATA (MW2)

Initial Displacement: 1. ft Static Water Column Height: 12.55 ft
Total Well Penetration Depth: 12.55 ft Screen Length: 10. ft
Casing Radius: 0.083 ft Well Radius: 0.33 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.5896 ft/day y0 = 0.9474 ft



WELL TEST ANALYSIS

Data Set: C:\Users\JAlbano\Documents\49\Site 49 May 2011 Slug Testing\MW2-2.aqt
Date: 02/09/12 Time: 15:15:53

PROJECT INFORMATION

Company: CH2M HILL
Client: Navy
Location: MCB CamLej
Test Well: IR Site 49
Test Date: 5/5/11

AQUIFER DATA

Saturated Thickness: 100. ft Anisotropy Ratio (Kz/Kr): 1.

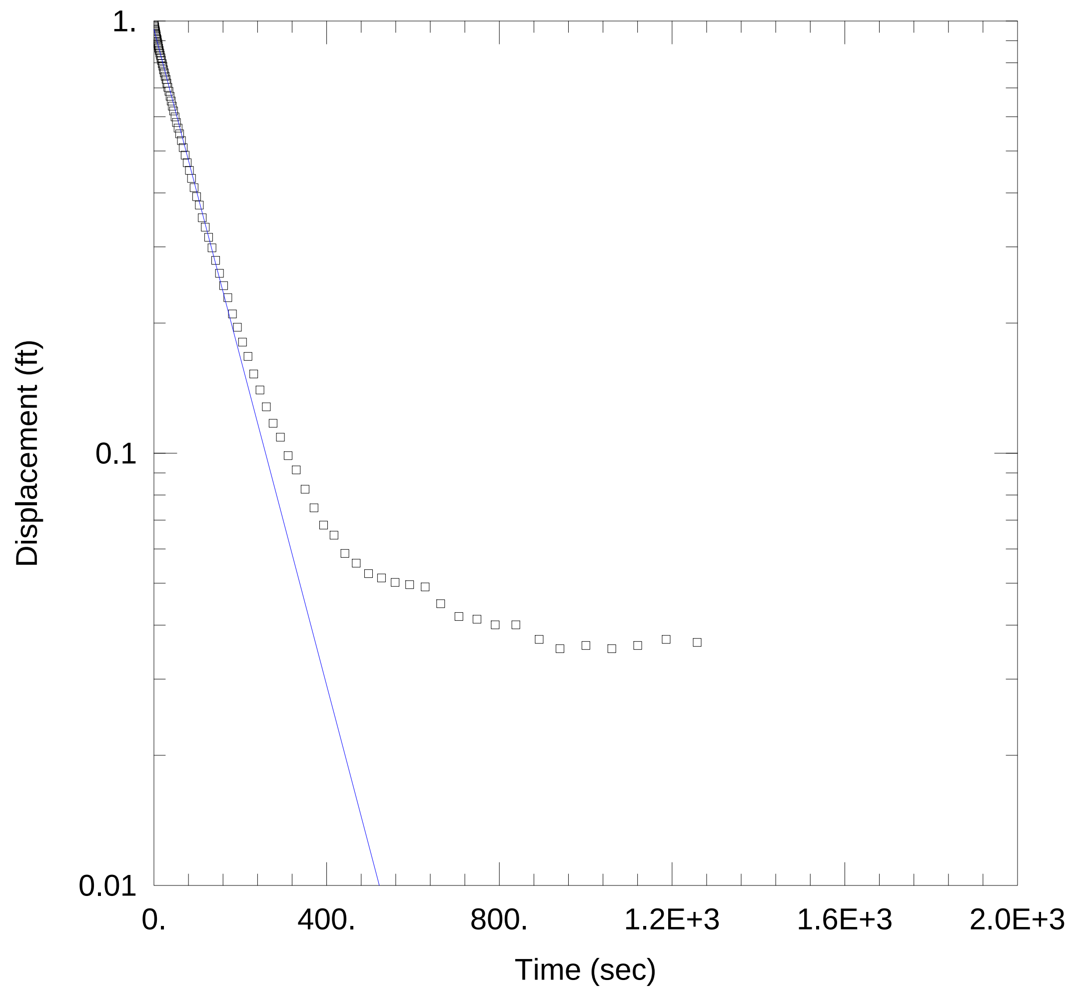
WELL DATA (MW2)

Initial Displacement: 1. ft Static Water Column Height: 12.55 ft
Total Well Penetration Depth: 12.55 ft Screen Length: 10. ft
Casing Radius: 0.083 ft Well Radius: 0.33 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.5614 ft/day y0 = 0.9211 ft



WELL TEST ANALYSIS

Data Set: C:\Users\JAlbano\Documents\49\Site 49 May 2011 Slug Testing\MW2-3.aqt
Date: 02/09/12 Time: 15:15:56

PROJECT INFORMATION

Company: CH2M HILL
Client: Navy
Location: MCB CamLej
Test Well: IR Site 49
Test Date: 5/5/11

AQUIFER DATA

Saturated Thickness: 100. ft Anisotropy Ratio (Kz/Kr): 1.

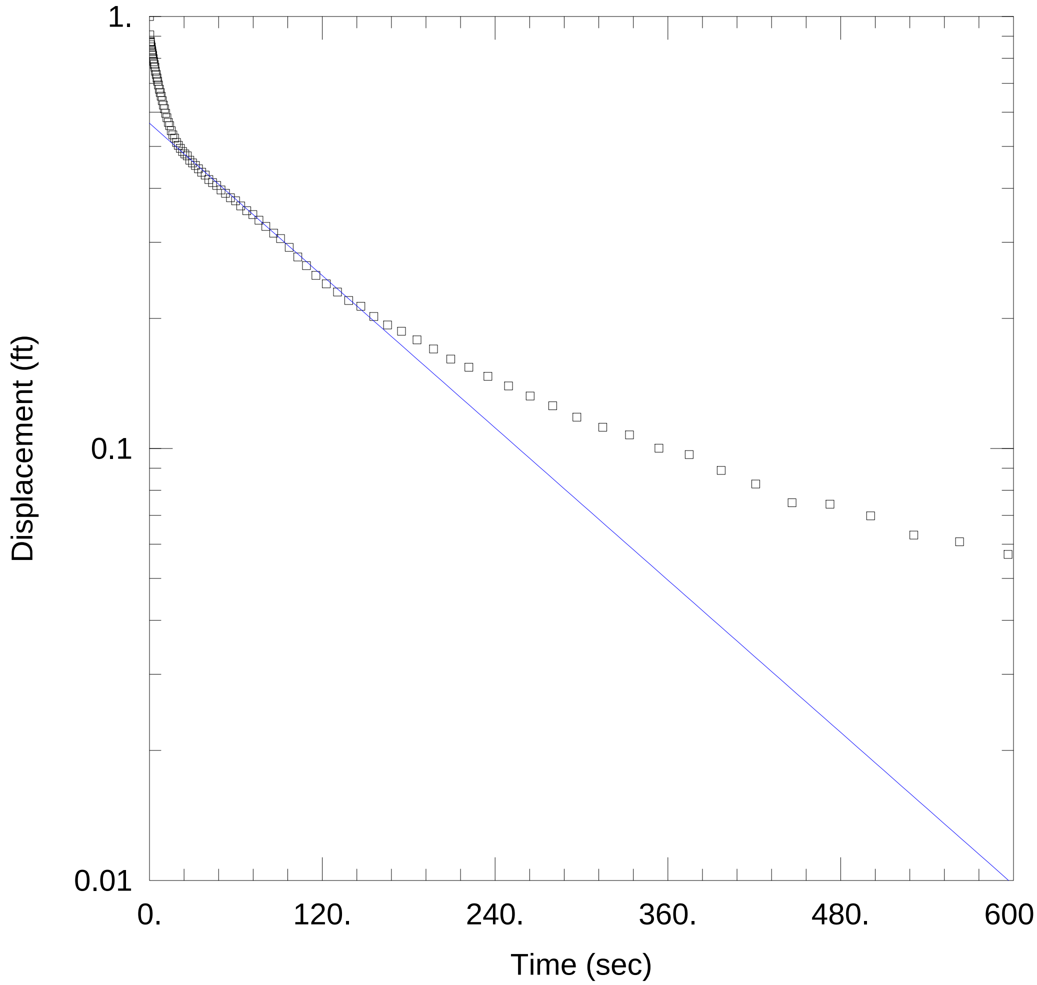
WELL DATA (MW2)

Initial Displacement: 1. ft Static Water Column Height: 12.55 ft
Total Well Penetration Depth: 12.55 ft Screen Length: 10. ft
Casing Radius: 0.083 ft Well Radius: 0.33 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.5692 ft/day y0 = 0.9563 ft



WELL TEST ANALYSIS

Data Set: C:\Users\JAlbano\Documents\49\Site 49 May 2011 Slug Testing\MW3-1.aqt
Date: 02/09/12 Time: 15:16:02

PROJECT INFORMATION

Company: CH2M HILL
Client: Navy
Location: MCB CamLej
Test Well: IR Site 49
Test Date: 5/5/11

AQUIFER DATA

Saturated Thickness: 100. ft Anisotropy Ratio (Kz/Kr): 1.

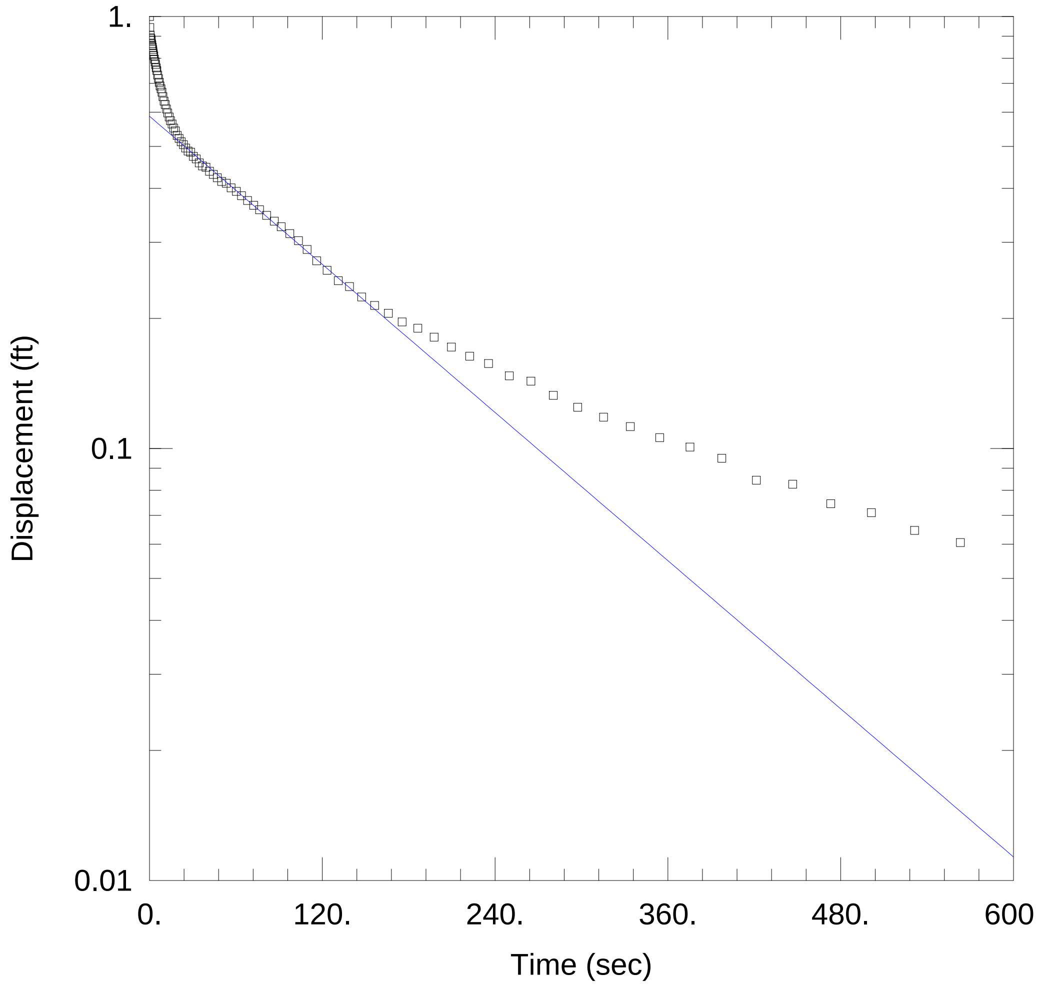
WELL DATA (MW3)

Initial Displacement: 1. ft
Total Well Penetration Depth: 11.67 ft
Casing Radius: 0.083 ft
Static Water Column Height: 11.67 ft
Screen Length: 10. ft
Well Radius: 0.33 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.4347 ft/day y0 = 0.5658 ft



WELL TEST ANALYSIS

Data Set: C:\Users\JAlbano\Documents\49\Site 49 May 2011 Slug Testing\MW3-2.aqt
Date: 02/09/12 Time: 15:16:08

PROJECT INFORMATION

Company: CH2M HILL
Client: Navy
Location: MCB CamLej
Test Well: IR Site 49
Test Date: 5/5/11

AQUIFER DATA

Saturated Thickness: 100. ft Anisotropy Ratio (Kz/Kr): 1.

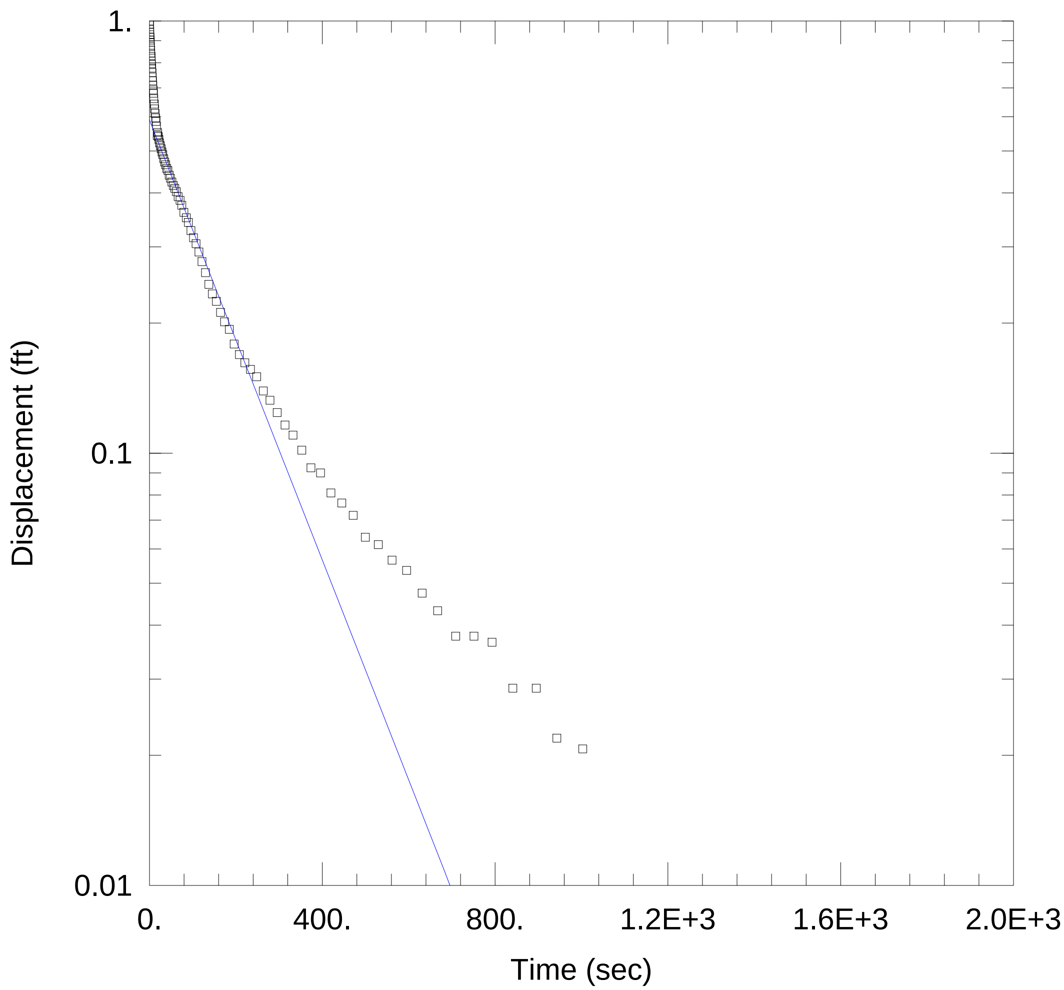
WELL DATA (MW3)

Initial Displacement: 1. ft
Static Water Column Height: 11.67 ft
Total Well Penetration Depth: 11.67 ft
Screen Length: 10. ft
Casing Radius: 0.083 ft
Well Radius: 0.33 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.4229 ft/day
y0 = 0.5874 ft



WELL TEST ANALYSIS

Data Set: C:\Users\JAlbano\Documents\49\Site 49 May 2011 Slug Testing\MW3-3.aqt
Date: 02/09/12 Time: 15:16:12

PROJECT INFORMATION

Company: CH2M HILL
Client: Navy
Location: MCB CamLej
Test Well: IR Site 49
Test Date: 5/5/11

AQUIFER DATA

Saturated Thickness: 100. ft Anisotropy Ratio (Kz/Kr): 1.

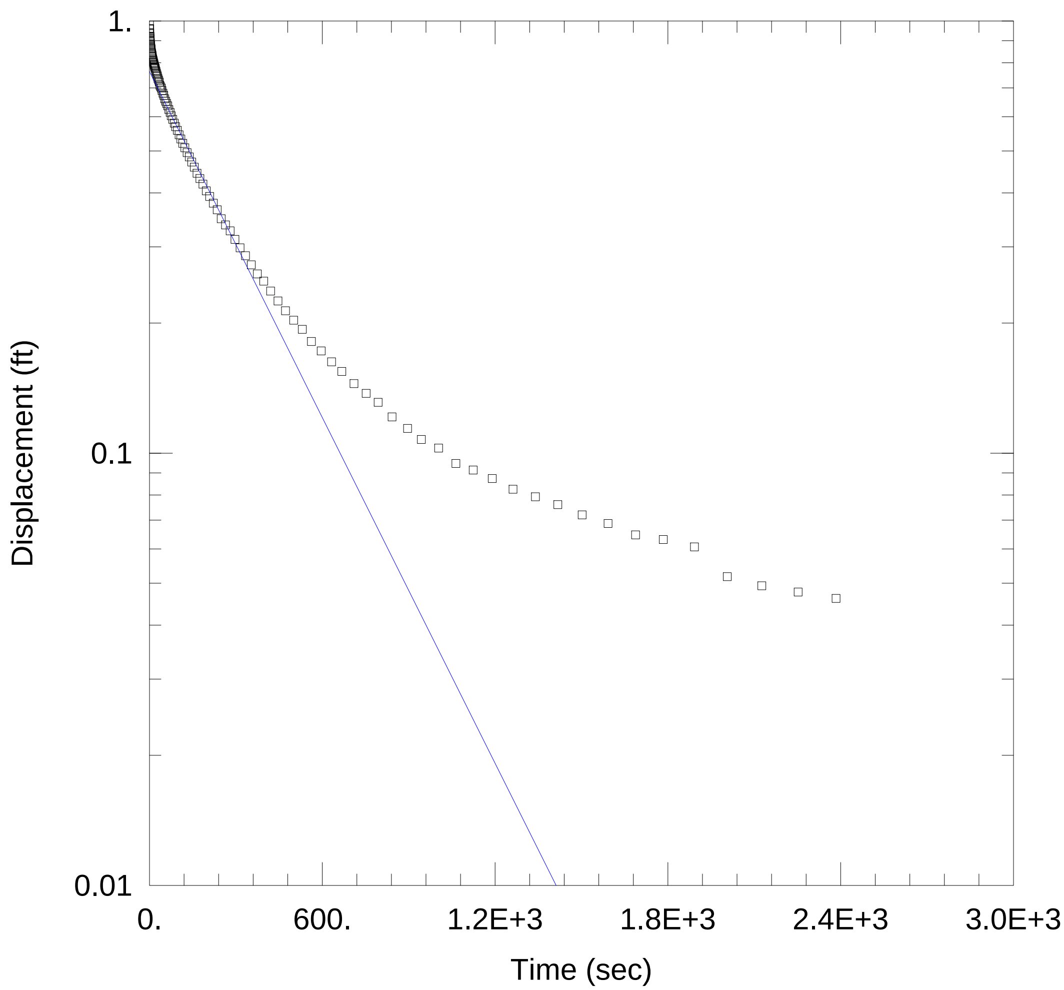
WELL DATA (MW3)

Initial Displacement: 1. ft Static Water Column Height: 11.67 ft
Total Well Penetration Depth: 11.67 ft Screen Length: 10. ft
Casing Radius: 0.083 ft Well Radius: 0.33 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.3766 ft/day y0 = 0.5899 ft



WELL TEST ANALYSIS

Data Set: C:\Users\JAlbano\Documents\49\Site 49 May 2011 Slug Testing\MW4-1.aqt
Date: 02/09/12 Time: 15:16:15

PROJECT INFORMATION

Company: CH2M HILL
Client: Navy
Location: MCB CamLej
Test Well: IR Site 49
Test Date: 5/5/11

AQUIFER DATA

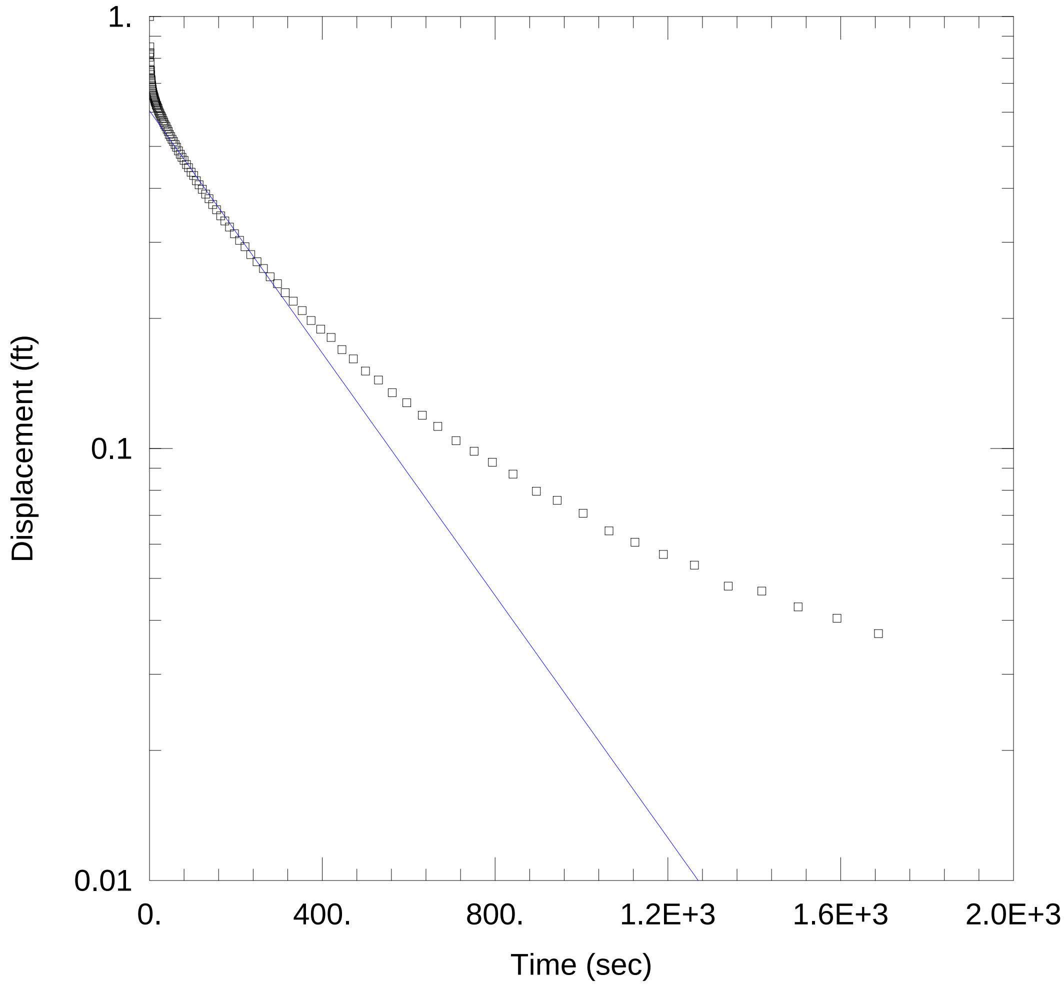
Saturated Thickness: 100. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW4)

Initial Displacement: 1. ft
Static Water Column Height: 14.59 ft
Total Well Penetration Depth: 14.59 ft
Screen Length: 10. ft
Casing Radius: 0.083 ft
Well Radius: 0.33 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.2056 ft/day
y0 = 0.7633 ft



WELL TEST ANALYSIS

Data Set: C:\Users\JAlbano\Documents\49\Site 49 May 2011 Slug Testing\MW4-2.aqt
Date: 02/09/12 Time: 15:16:19

PROJECT INFORMATION

Company: CH2M HILL
Client: Navy
Location: MCB CamLej
Test Well: IR Site 49
Test Date: 5/5/11

AQUIFER DATA

Saturated Thickness: 100. ft Anisotropy Ratio (Kz/Kr): 1.

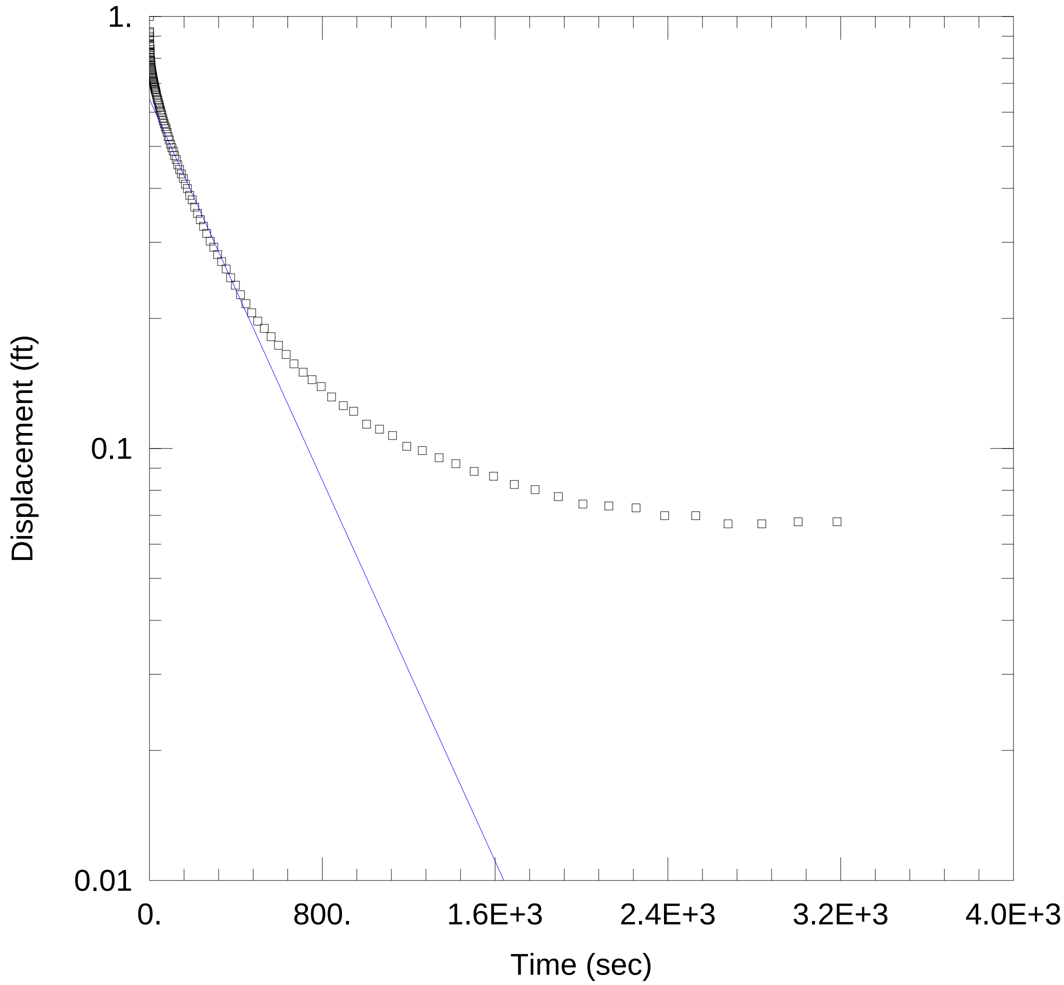
WELL DATA (MW4)

Initial Displacement: 1. ft Static Water Column Height: 14.59 ft
Total Well Penetration Depth: 14.59 ft Screen Length: 10. ft
Casing Radius: 0.083 ft Well Radius: 0.33 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.2163 ft/day y0 = 0.6047 ft



WELL TEST ANALYSIS

Data Set: C:\Users\JAlbano\Documents\49\Site 49 May 2011 Slug Testing\MW4-3.aqt
Date: 02/09/12 Time: 15:16:22

PROJECT INFORMATION

Company: CH2M HILL
Client: Navy
Location: MCB CamLej
Test Well: IR Site 49
Test Date: 5/5/11

AQUIFER DATA

Saturated Thickness: 100. ft Anisotropy Ratio (Kz/Kr): 1.

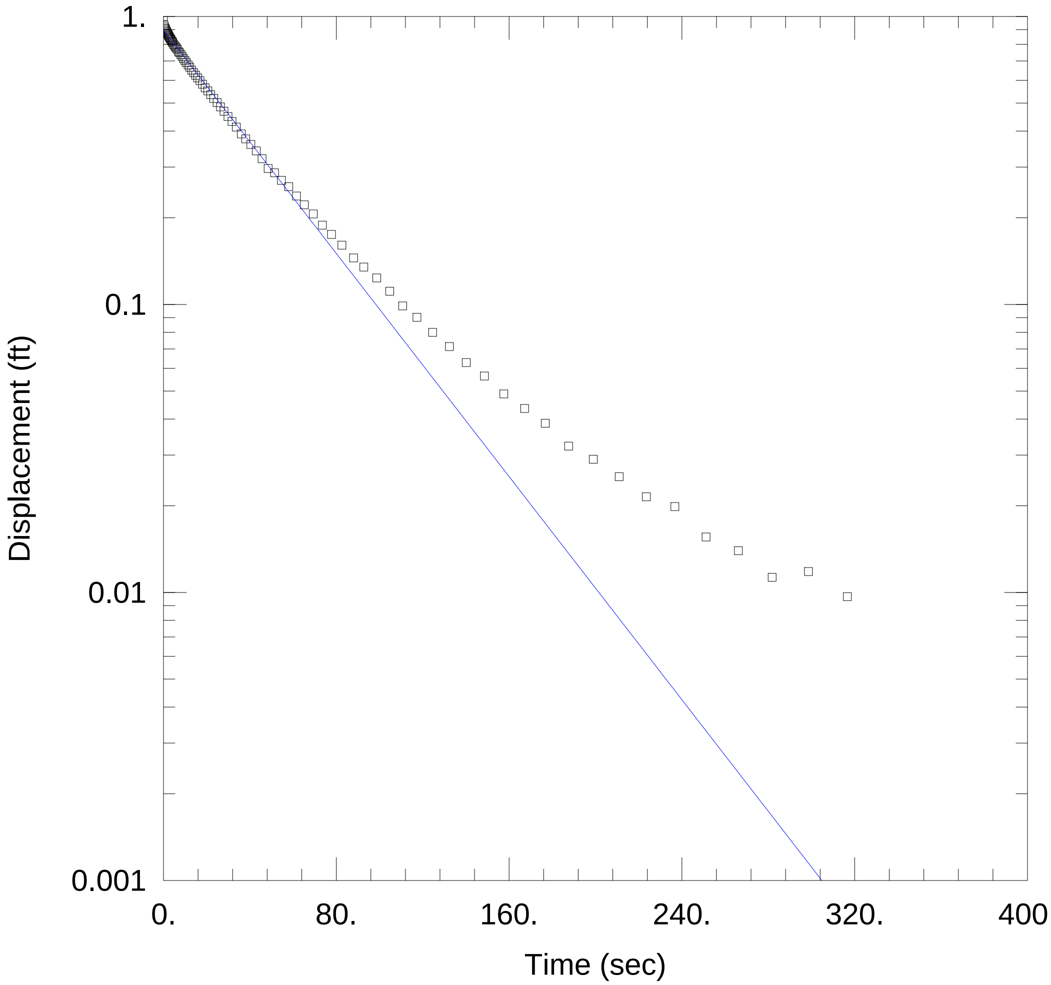
WELL DATA (MW4)

Initial Displacement: 1. ft Static Water Column Height: 14.59 ft
Total Well Penetration Depth: 14.59 ft Screen Length: 10. ft
Casing Radius: 0.083 ft Well Radius: 0.33 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.17 ft/day y0 = 0.6428 ft



WELL TEST ANALYSIS

Data Set: C:\Users\JAlbano\Documents\49\Site 49 May 2011 Slug Testing\MW5-1.aqt
Date: 02/09/12 Time: 15:16:26

PROJECT INFORMATION

Company: CH2M HILL
Client: Navy
Location: MCB CamLej
Test Well: IR Site 49
Test Date: 5/5/11

AQUIFER DATA

Saturated Thickness: 100. ft Anisotropy Ratio (Kz/Kr): 1.

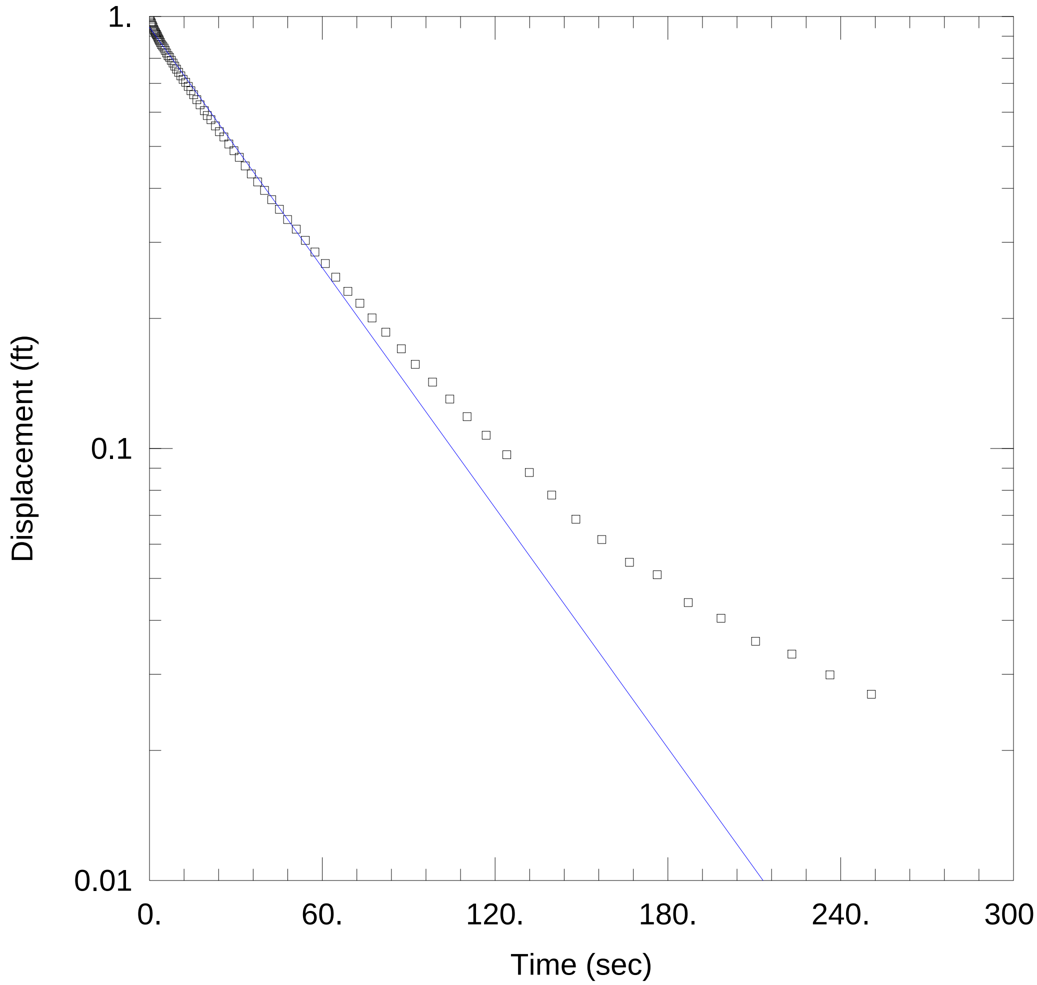
WELL DATA (MW5)

Initial Displacement: 1. ft Static Water Column Height: 12.85 ft
Total Well Penetration Depth: 12.85 ft Screen Length: 10. ft
Casing Radius: 0.083 ft Well Radius: 0.33 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 1.459 ft/day y0 = 0.895 ft



WELL TEST ANALYSIS

Data Set: C:\Users\JAlbano\Documents\49\Site 49 May 2011 Slug Testing\MW5-2.aqt
Date: 02/09/12 Time: 15:16:30

PROJECT INFORMATION

Company: CH2M HILL
Client: Navy
Location: MCB CamLej
Test Well: IR Site 49
Test Date: 5/5/11

AQUIFER DATA

Saturated Thickness: 100. ft
Anisotropy Ratio (Kz/Kr): 1.

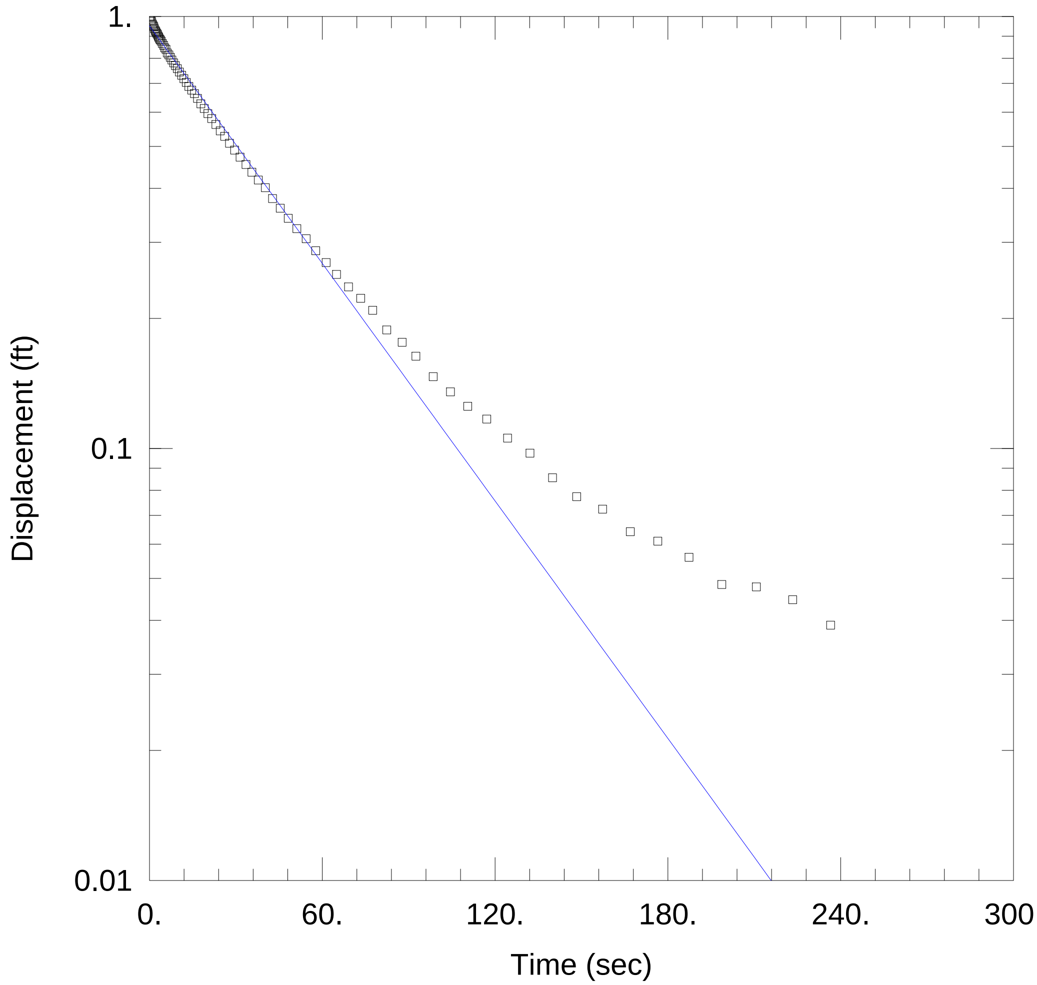
WELL DATA (MW5)

Initial Displacement: 1. ft
Static Water Column Height: 12.85 ft
Total Well Penetration Depth: 12.85 ft
Screen Length: 10. ft
Casing Radius: 0.083 ft
Well Radius: 0.33 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 1.397 ft/day
y0 = 0.9434 ft



WELL TEST ANALYSIS

Data Set: C:\Users\JAlbano\Documents\49\Site 49 May 2011 Slug Testing\MW5-3.aqt
Date: 02/09/12 Time: 15:16:33

PROJECT INFORMATION

Company: CH2M HILL
Client: Navy
Location: MCB CamLej
Test Well: IR Site 49
Test Date: 5/5/11

AQUIFER DATA

Saturated Thickness: 100. ft Anisotropy Ratio (Kz/Kr): 1.

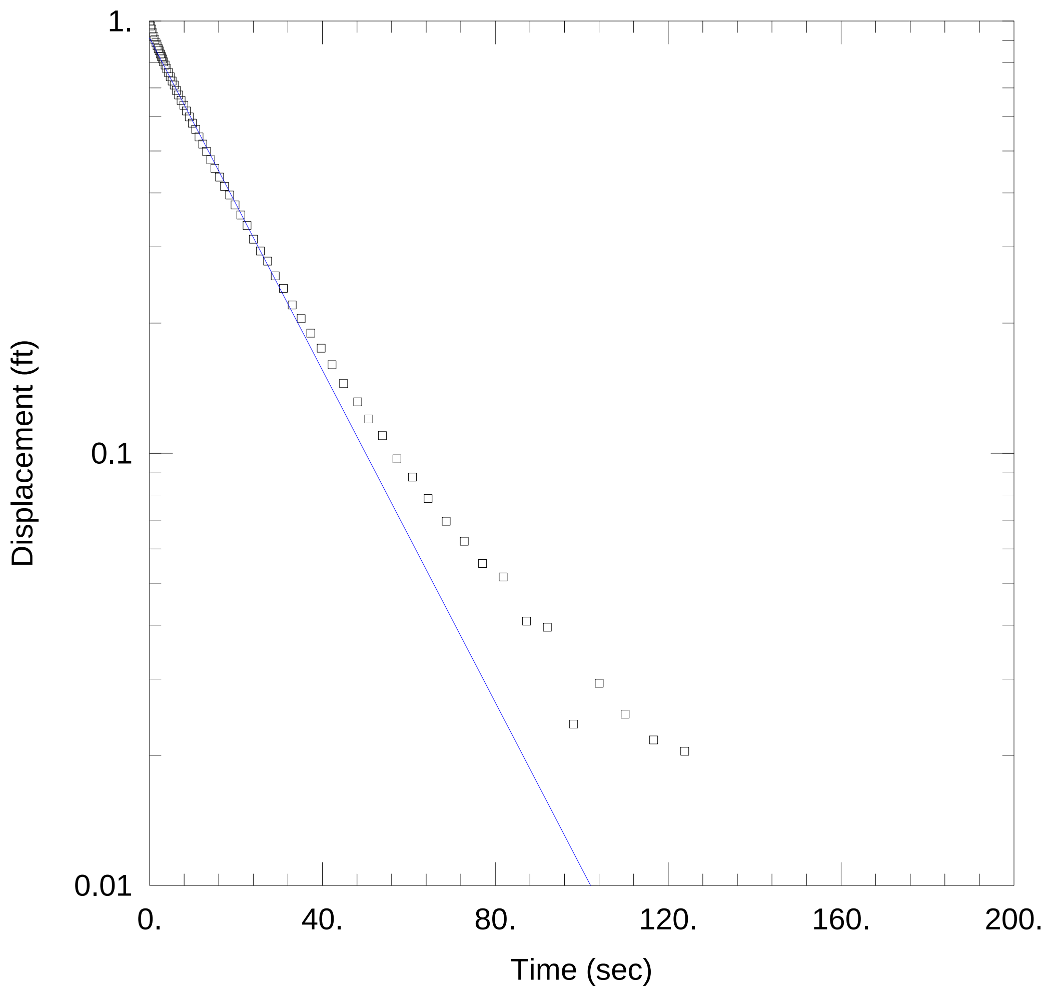
WELL DATA (MW5)

Initial Displacement: 1. ft
Total Well Penetration Depth: 12.85 ft
Casing Radius: 0.083 ft
Static Water Column Height: 12.85 ft
Screen Length: 10. ft
Well Radius: 0.33 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 1.381 ft/day y0 = 0.9505 ft



WELL TEST ANALYSIS

Data Set: C:\Users\JAlbano\Documents\49\Site 49 May 2011 Slug Testing\MW6-1.aqt
Date: 02/09/12 Time: 15:16:37

PROJECT INFORMATION

Company: CH2M HILL
Client: Navy
Location: MCB CamLej
Test Well: IR Site 49
Test Date: 5/5/11

AQUIFER DATA

Saturated Thickness: 100. ft
Anisotropy Ratio (Kz/Kr): 1.

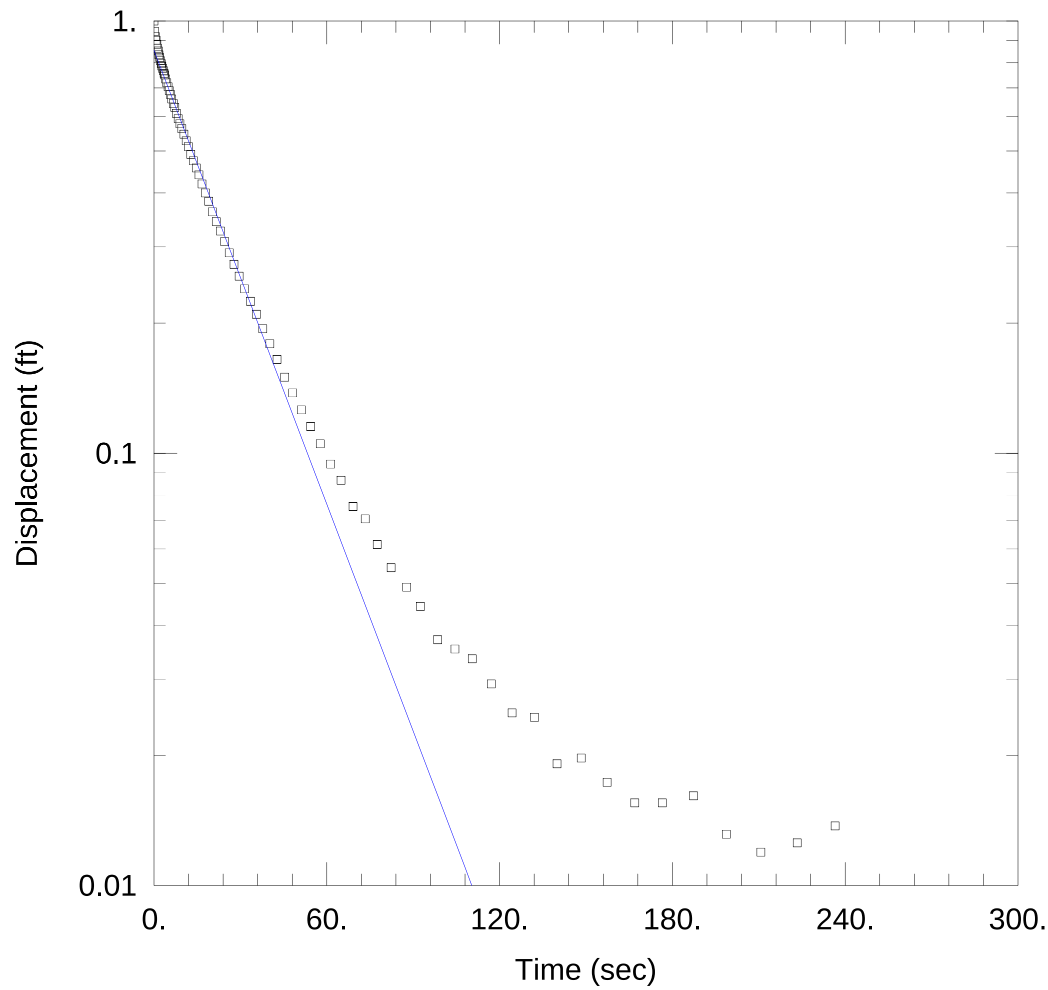
WELL DATA (MW6)

Initial Displacement: 1. ft
Total Well Penetration Depth: 13.02 ft
Casing Radius: 0.083 ft
Static Water Column Height: 13.02 ft
Screen Length: 10. ft
Well Radius: 0.33 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 2.902 ft/day
y0 = 0.9126 ft



WELL TEST ANALYSIS

Data Set: C:\Users\JAlbano\Documents\49\Site 49 May 2011 Slug Testing\MW6-2.aqt
Date: 02/09/12 Time: 15:16:40

PROJECT INFORMATION

Company: CH2M HILL
Client: Navy
Location: MCB CamLej
Test Well: IR Site 49
Test Date: 5/5/11

AQUIFER DATA

Saturated Thickness: 100. ft
Anisotropy Ratio (Kz/Kr): 1.

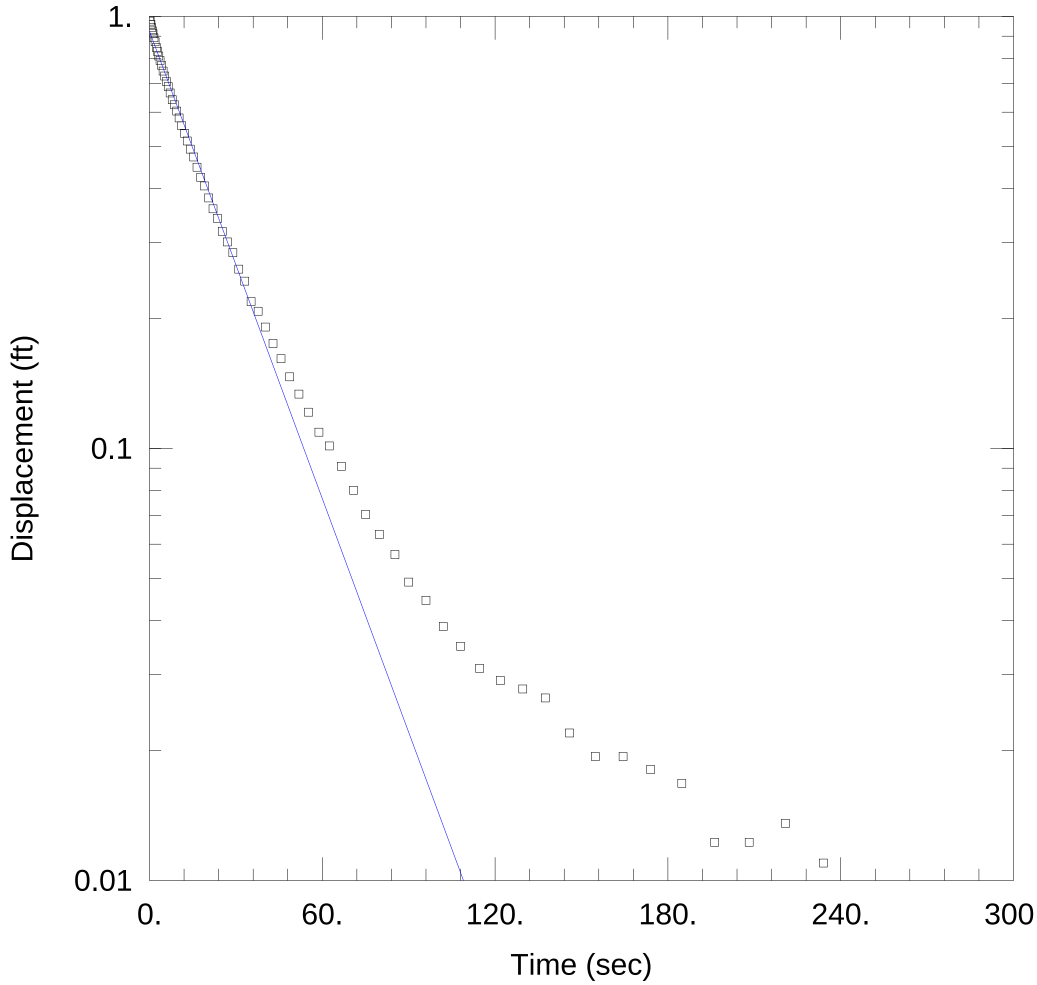
WELL DATA (MW6)

Initial Displacement: 1. ft
Total Well Penetration Depth: 13.02 ft
Casing Radius: 0.083 ft
Static Water Column Height: 13.02 ft
Screen Length: 10. ft
Well Radius: 0.33 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 2.644 ft/day
y0 = 0.8553 ft



WELL TEST ANALYSIS

Data Set: C:\Users\JAlbano\Documents\49\Site 49 May 2011 Slug Testing\MW6-3.aqt
Date: 02/09/12 Time: 15:16:44

PROJECT INFORMATION

Company: CH2M HILL
Client: Navy
Location: MCB CamLej
Test Well: IR Site 49
Test Date: 5/5/11

AQUIFER DATA

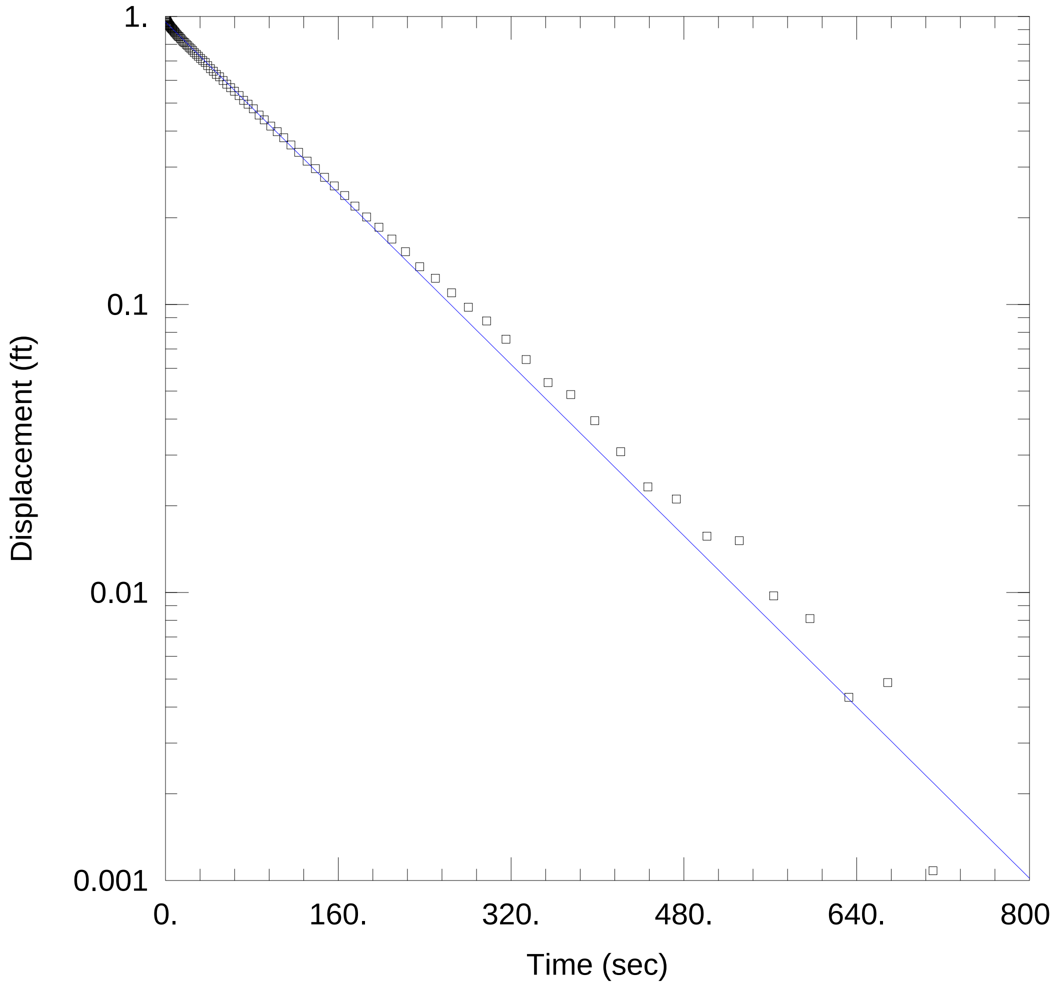
Saturated Thickness: 100. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW6)

Initial Displacement: 1. ft
Static Water Column Height: 13.02 ft
Total Well Penetration Depth: 13.02 ft
Screen Length: 10. ft
Casing Radius: 0.083 ft
Well Radius: 0.33 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 2.724 ft/day
y0 = 0.9244 ft



WELL TEST ANALYSIS

Data Set: C:\Users\JAlbano\Documents\49\Site 49 May 2011 Slug Testing\MW7-1.aqt
Date: 02/09/12 Time: 15:16:47

PROJECT INFORMATION

Company: CH2M HILL
Client: Navy
Location: MCB CamLej
Test Well: IR Site 49
Test Date: 5/5/11

AQUIFER DATA

Saturated Thickness: 100. ft Anisotropy Ratio (Kz/Kr): 1.

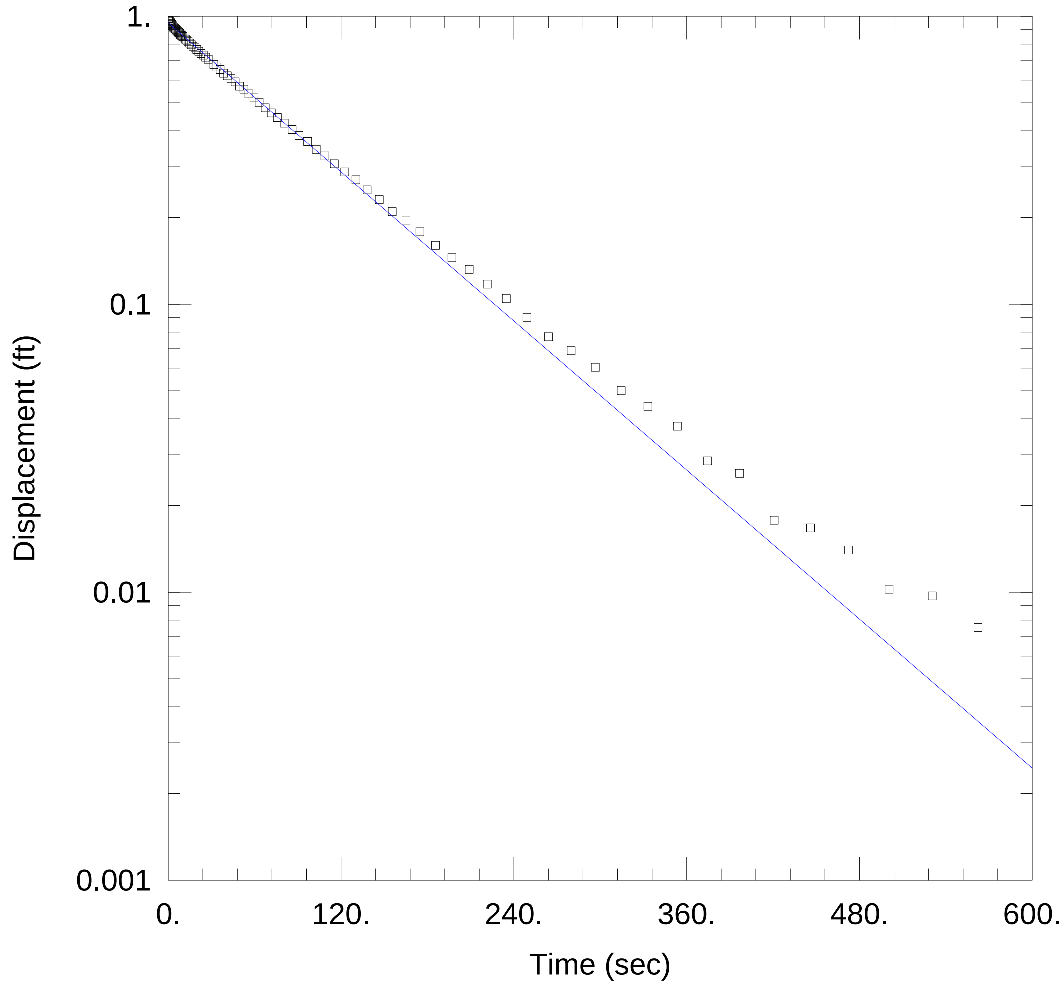
WELL DATA (MW7)

Initial Displacement: 1. ft Static Water Column Height: 13.07 ft
Total Well Penetration Depth: 8.07 ft Screen Length: 5. ft
Casing Radius: 0.083 ft Well Radius: 0.33 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.8633 ft/day y0 = 0.9567 ft



WELL TEST ANALYSIS

Data Set: C:\Users\JAlbano\Documents\49\Site 49 May 2011 Slug Testing\MW7-2.aqt
Date: 02/09/12 Time: 15:16:51

PROJECT INFORMATION

Company: CH2M HILL
Client: Navy
Location: MCB CamLej
Test Well: IR Site 49
Test Date: 5/5/11

AQUIFER DATA

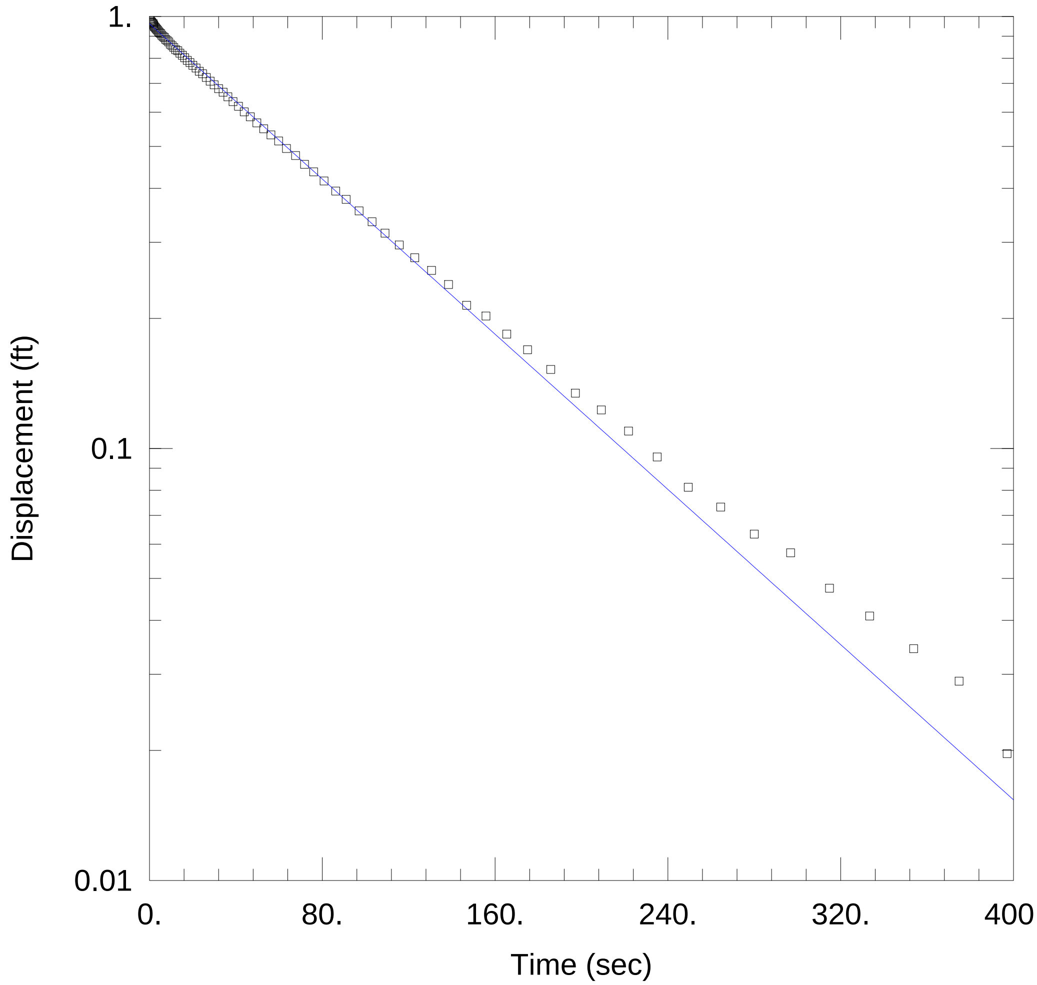
Saturated Thickness: 100. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW7)

Initial Displacement: 1. ft Static Water Column Height: 13.07 ft
Total Well Penetration Depth: 8.07 ft Screen Length: 5. ft
Casing Radius: 0.083 ft Well Radius: 0.33 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice
K = 1.002 ft/day y0 = 0.9478 ft



WELL TEST ANALYSIS

Data Set: C:\Users\JAlbano\Documents\49\Site 49 May 2011 Slug Testing\MW7-3.aqt
Date: 02/09/12 Time: 15:17:33

PROJECT INFORMATION

Company: CH2M HILL
Client: Navy
Location: MCB CamLej
Test Well: IR Site 49
Test Date: 5/5/11

AQUIFER DATA

Saturated Thickness: 100. ft Anisotropy Ratio (Kz/Kr): 1.

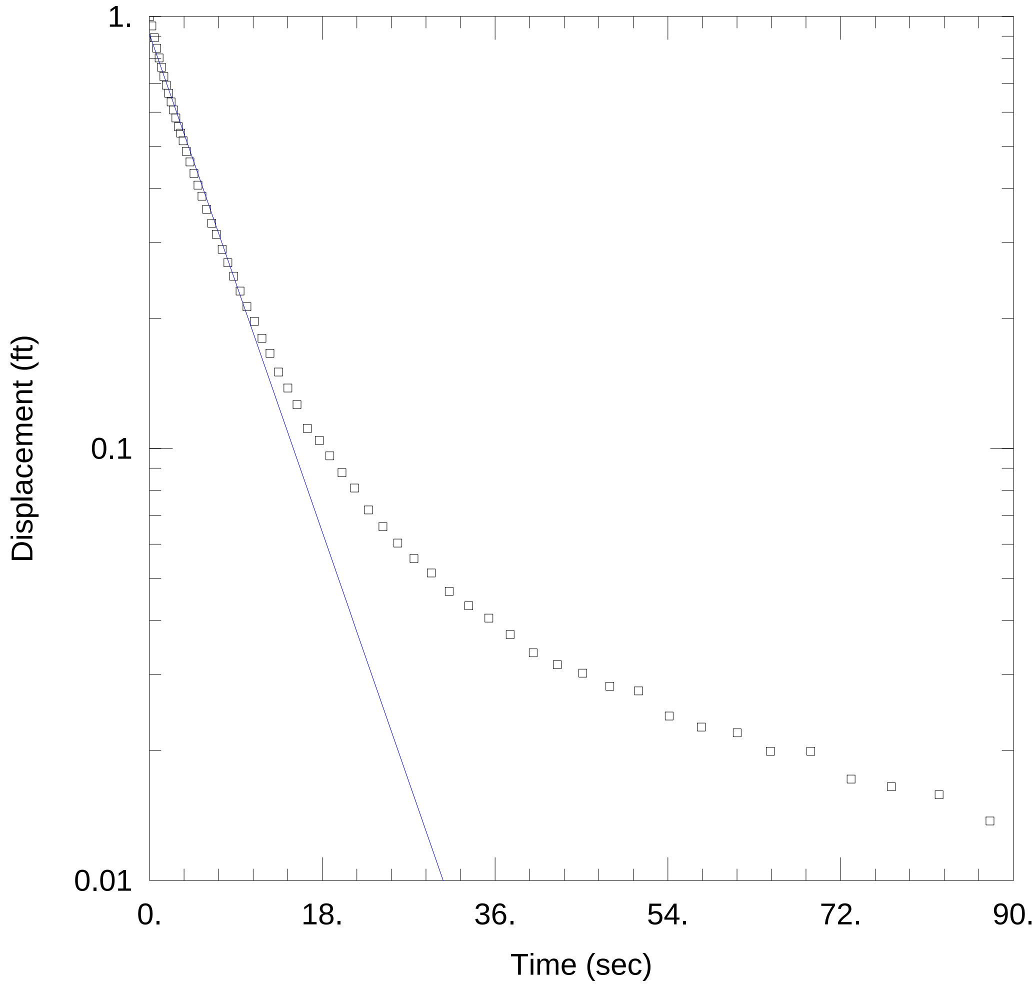
WELL DATA (MW7)

Initial Displacement: 1. ft
Total Well Penetration Depth: 8.07 ft
Casing Radius: 0.083 ft
Static Water Column Height: 13.07 ft
Screen Length: 5. ft
Well Radius: 0.33 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 1.043 ft/day y0 = 0.9614 ft



WELL TEST ANALYSIS

Data Set: C:\Users\JAlbano\Documents\49\Site 49 May 2011 Slug Testing\MW8-1.aqt
Date: 02/09/12 Time: 15:17:38

PROJECT INFORMATION

Company: CH2M HILL
Client: Navy
Location: MCB CamLej
Test Well: IR Site 49
Test Date: 5/5/11

AQUIFER DATA

Saturated Thickness: 100. ft Anisotropy Ratio (Kz/Kr): 1.

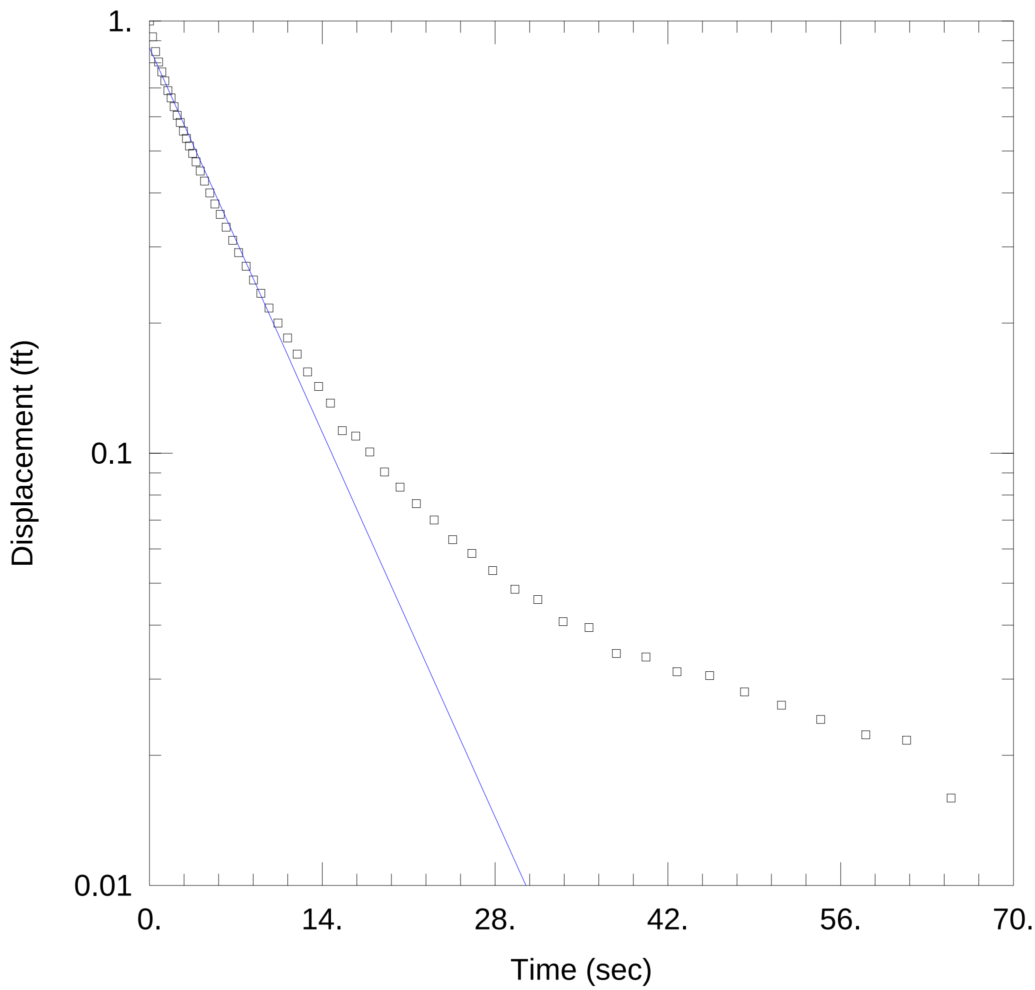
WELL DATA (MW8)

Initial Displacement: 1. ft
Total Well Penetration Depth: 36.87 ft
Casing Radius: 0.083 ft
Static Water Column Height: 36.87 ft
Screen Length: 5. ft
Well Radius: 0.33 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 18.6 ft/day y0 = 0.9095 ft



WELL TEST ANALYSIS

Data Set: C:\Users\JAlbano\Documents\49\Site 49 May 2011 Slug Testing\MW8-2.aqt
Date: 02/09/12 Time: 15:17:41

PROJECT INFORMATION

Company: CH2M HILL
Client: Navy
Location: MCB CamLej
Test Well: IR Site 49
Test Date: 5/5/11

AQUIFER DATA

Saturated Thickness: 100. ft
Anisotropy Ratio (Kz/Kr): 1.

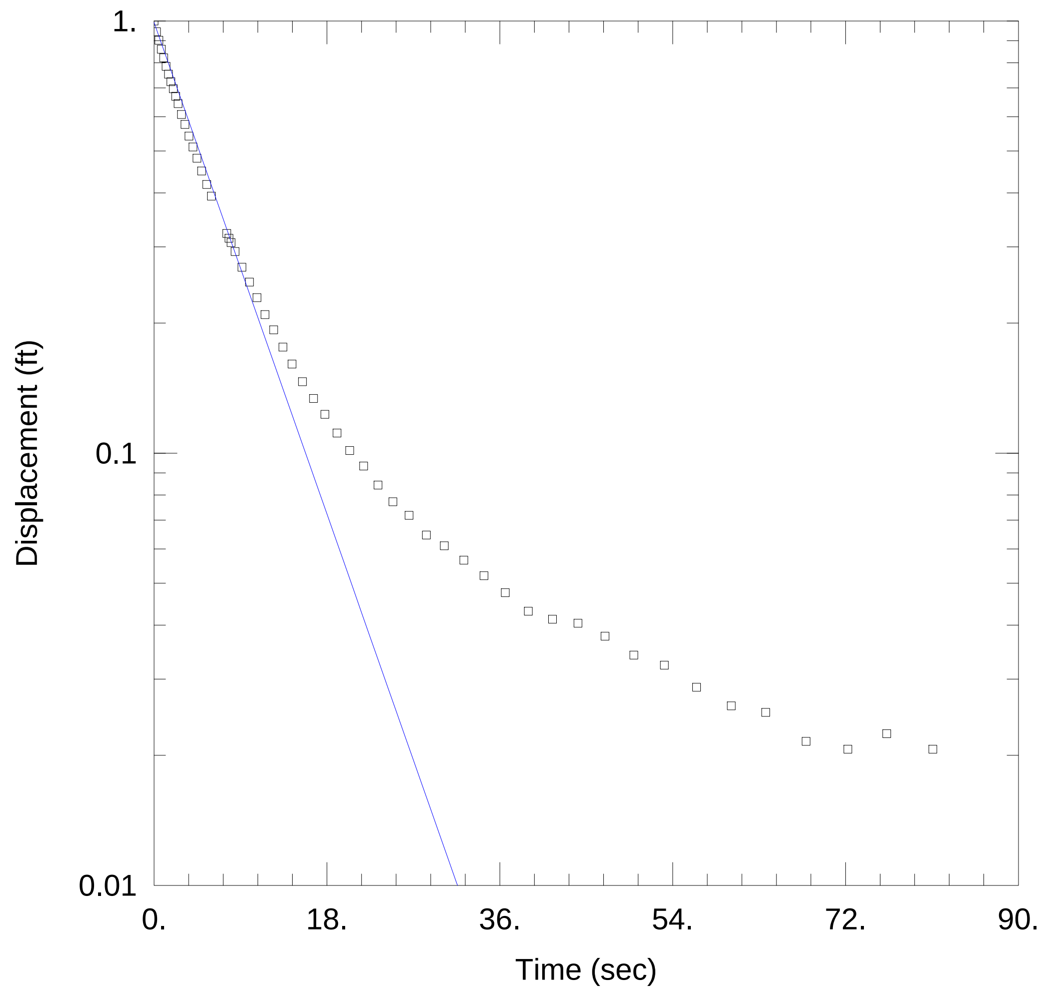
WELL DATA (MW8)

Initial Displacement: 1. ft
Static Water Column Height: 36.87 ft
Total Well Penetration Depth: 36.87 ft
Screen Length: 5. ft
Casing Radius: 0.083 ft
Well Radius: 0.33 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 18.46 ft/day
y0 = 0.8671 ft



WELL TEST ANALYSIS

Data Set: C:\Users\JAlbano\Documents\49\Site 49 May 2011 Slug Testing\MW8-3.aqt
Date: 02/09/12 Time: 15:17:46

PROJECT INFORMATION

Company: CH2M HILL
Client: Navy
Location: MCB CamLej
Test Well: IR Site 49
Test Date: 5/5/11

AQUIFER DATA

Saturated Thickness: 100. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW8)

Initial Displacement: 1. ft Static Water Column Height: 36.87 ft
Total Well Penetration Depth: 36.87 ft Screen Length: 5. ft
Casing Radius: 0.083 ft Well Radius: 0.33 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 18.36 ft/day y0 = 0.9918 ft

Appendix E
Raw Analytical Data

CTO-WE36
Camp Lejeune - Site 49
Unvalidated Direct Push Soil Detected Analytical Results
April 2011

Sample ID	IR49-MW01-14-16-11A	IR49-MW06-14-15-11A	IR49-MW06-15-16-11A	IR49-MW08-35-37-11A
Sample Date	3/30/11	3/29/11	3/29/11	3/31/11
Chemical Name				
Geotechnical (PCT/P)				
GS10 Sieve 0.375" (9.5 mm)	96	93	100	95
Sieve No. 004 (4.75 mm)	90	85	100	88
Sieve No. 008 (2.36-MM)	87	81	99	82
Sieve No. 010 (2.00 mm)	87	81	99	81
Sieve No. 016 (1.18-MM)	86	78	98	78
Sieve No. 020 (850 um)	85	77	96	77
Sieve No. 030 (600-UM)	83	75	90	75
Sieve No. 040 (425 um)	81	74	82	72
Sieve No. 050 (300-UM)	76	70	68	62
Sieve No. 060 (250 um)	72	65	57	53
Sieve No. 100 (150 um)	55	45	24	22
Sieve No. 140 (106 um)	38	29	14	15
Sieve No. 200 (75 um)	16	13	5.8	12

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Notes:

PCT/P - Percent Passed
Shading indicates detection

CTO-WE36
Camp Lejeune - Site 49
Unvalidated Direct Push Soil Raw Analytical Results
April 2011

Sample ID	IR49-MW01-14-16-11A	IR49-MW06-14-15-11A	IR49-MW06-15-16-11A	IR49-MW08-35-37-11A
Sample Date	3/30/11	3/29/11	3/29/11	3/31/11
Chemical Name				
Geotechnical (PCT/P)				
GS10 Sieve 0.375" (9.5 mm)	96	93	100	95
Sieve No. 004 (4.75 mm)	90	85	100	88
Sieve No. 008 (2.36-MM)	87	81	99	82
Sieve No. 010 (2.00 mm)	87	81	99	81
Sieve No. 016 (1.18-MM)	86	78	98	78
Sieve No. 020 (850 um)	85	77	96	77
Sieve No. 030 (600-UM)	83	75	90	75
Sieve No. 040 (425 um)	81	74	82	72
Sieve No. 050 (300-UM)	76	70	68	62
Sieve No. 060 (250 um)	72	65	57	53
Sieve No. 100 (150 um)	55	45	24	22
Sieve No. 140 (106 um)	38	29	14	15
Sieve No. 200 (75 um)	16	13	5.8	12

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Notes:

PCT/P - Percent Passed

Station ID	IR49-SS02	IR49-SS03	IR49-SS04	IR49-SS05	IR49-SS06	IR49-SS07	IR49-SS08		IR49-SS09		IR49-SS10	IR49-SS11	IR49-SS12		IR49-SS13	
Sample ID	IR49-SS02-11A	IR49-SS03-11A	IR49-SS04-11A	IR49-SS05-11A	IR49-SS06-11A	IR49-SS07-11A	IR49-SS08-11A	IR49-SS08-11B	IR49-SS09-11A	IR49-SS09D-11A	IR49-SS10-11A	IR49-SS11-11A	IR49-SS12-11A	IR49-SS12D-11B	IR49-SS13-11A	IR49-SS13-11B
Sample Date	03/29/11	03/29/11	03/29/11	03/29/11	03/29/11	03/29/11	03/28/11	04/18/11	03/28/11	03/28/11	03/28/11	03/28/11	03/28/11	04/18/11	03/28/11	04/18/11
Chemical Name																
Volatile Organic Compounds (µg/kg)																
1,1,1-Trichloroethane	63 U	32 U	29 U	0.5 U	53 U	0.49 UJ	NA	41 U	40 U	41 U	32 U	74 U	210 U	120 U	NA	0.77 U
1,1,2,2-Tetrachloroethane	130 U	64 U	57 U	0.5 UJ	110 U	0.86 J	NA	82 U	79 U	82 U	63 U	150 U	410 U	230 U	NA	0.77 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	63 U	32 U	29 U	0.5 U	53 U	0.49 UJ	NA	41 U	40 U	41 U	32 U	74 U	210 U	120 U	NA	0.77 U
1,1,2-Trichloroethane	63 U	32 U	29 U	0.5 U	53 U	0.49 UJ	NA	41 U	40 U	41 U	32 U	74 U	210 U	120 U	NA	0.77 U
1,1-Dichloroethane	31 U	16 U	14 U	0.25 U	27 U	0.25 UJ	NA	20 U	20 U	21 U	16 U	37 U	100 U	58 U	NA	0.39 U
1,1-Dichloroethene	63 U	32 U	29 U	0.5 U	53 U	0.49 UJ	NA	41 U	40 U	41 U	32 U	74 U	210 U	120 U	NA	0.77 U
1,2,4-Trichlorobenzene	63 U	32 U	29 U	0.5 UJ	53 U	0.49 UJ	NA	41 U	40 U	41 U	32 U	74 U	210 U	120 U	NA	0.77 U
1,2-Dibromo-3-chloropropane	63 U	32 U	29 U	0.5 UJ	53 U	0.49 UJ	NA	41 U	40 U	41 U	32 U	74 U	210 U	120 U	NA	0.77 U
1,2-Dibromoethane	63 U	32 U	29 U	0.5 U	53 U	0.49 UJ	NA	41 U	40 U	41 U	32 U	74 U	210 U	120 U	NA	0.77 U
1,2-Dichlorobenzene	31 U	16 U	14 U	0.5 UJ	27 U	0.49 UJ	NA	20 U	20 U	21 U	16 U	37 U	100 U	58 U	NA	0.77 U
1,2-Dichloroethane	31 U	16 U	14 U	0.5 U	27 U	0.49 UJ	NA	20 U	20 U	21 U	16 U	37 U	100 U	58 U	NA	0.77 U
1,2-Dichloropropane	63 U	32 U	29 U	0.5 U	53 U	0.49 UJ	NA	41 U	40 U	41 U	32 U	74 U	210 U	120 U	NA	0.77 U
1,3-Dichlorobenzene	31 U	16 U	14 U	0.25 UJ	27 U	0.25 UJ	NA	20 U	20 U	21 U	16 U	37 U	100 U	58 U	NA	0.39 U
1,4-Dichlorobenzene	63 U	32 U	29 U	0.25 UJ	53 U	0.25 UJ	NA	41 U	40 U	41 U	32 U	74 U	210 U	120 U	NA	0.39 U
2-Butanone	130 U	64 U	57 U	7.3 J	110 U	15 J	NA	82 U	79 U	82 U	63 U	150 U	410 U	230 U	NA	0.77 R
2-Hexanone	63 U	32 U	29 U	0.5 U	53 U	0.49 UJ	NA	41 U	40 U	41 U	32 U	74 U	210 U	120 U	NA	0.77 U
4-Methyl-2-pentanone	63 U	32 U	29 U	0.5 U	53 U	0.49 UJ	NA	41 U	40 U	41 U	32 U	74 U	210 U	120 U	NA	0.77 U
Acetone	250 U	130 U	110 U	190 J	210 U	220 J	NA	160 U	230 U	170 U	170 U	300 U	810 U	470 U	NA	42 J
Benzene	63 U	32 U	29 U	0.5 U	53 U	1.9 J	NA	41 U	40 U	41 U	32 U	74 U	210 U	120 U	NA	0.77 U
Bromodichloromethane	31 U	16 U	14 U	0.5 U	27 U	0.49 UJ	NA	20 U	20 U	21 U	16 U	37 U	100 U	58 U	NA	0.77 U
Bromoform	63 U	32 U	29 U	0.25 U	53 U	0.25 UJ	NA	41 U	40 U	41 U	32 U	74 U	210 U	120 U	NA	0.39 U
Bromomethane	130 U	64 U	57 U	0.5 U	110 U	0.49 UJ	NA	82 U	79 U	82 U	63 U	150 U	410 U	230 U	NA	0.77 U
Carbon disulfide	15 J	16 U	14 U	0.68 J	27 U	12 J	NA	20 U	11 J	9 J	9.5 J	37 U	45 J	58 U	NA	1.6
Carbon tetrachloride	31 U	16 U	14 U	0.25 U	27 U	0.25 UJ	NA	20 U	20 U	21 U	16 U	37 U	100 U	58 U	NA	0.39 U
Chlorobenzene	63 U	32 U	29 U	0.25 U	53 U	0.25 UJ	NA	41 U	40 U	41 U	32 U	74 U	210 U	120 U	NA	0.39 U
Chloroethane	63 U	32 U	29 U	0.5 U	53 U	0.49 UJ	NA	41 U	40 U	41 U	32 U	74 U	210 U	120 U	NA	0.77 U
Chloroform	63 U	32 U	29 U	0.25 U	53 U	0.25 UJ	NA	41 U	40 U	41 U	32 U	74 U	210 U	120 U	NA	0.39 U
Chloromethane	63 U	32 U	29 U	0.5 U	53 U	0.49 UJ	NA	41 U	40 U	41 U	32 U	74 U	210 U	120 U	NA	0.77 U
cis-1,2-Dichloroethene	63 U	32 U	29 U	0.25 U	53 U	0.25 UJ	NA	41 U	40 U	41 U	32 U	74 U	210 U	120 U	NA	0.39 U
cis-1,3-Dichloropropene	63 U	32 U	29 U	0.25 U	53 U	0.25 UJ	NA	41 U	40 U	41 U	32 U	74 U	210 U	120 U	NA	0.39 U
Cyclohexane	63 U	32 U	29 U	0.5 U	53 U	0.98 J	NA	41 U	40 U	41 U	32 U	74 U	210 U	120 U	NA	0.77 U
Dibromochloromethane	63 U	32 U	29 U	0.5 U	53 U	0.49 UJ	NA	41 U	40 U	41 U	32 U	74 U	210 U	120 U	NA	0.77 U
Dichlorodifluoromethane (Freon-12)	63 U	32 U	29 U	0.5 U	53 U	0.49 UJ	NA	41 U	40 U	41 U	32 U	74 U	210 U	120 U	NA	0.77 U
Ethylbenzene	63 U	32 U	29 U	0.5 U	53 U	2.7 J	NA	41 U	40 U	41 U	32 U	74 U	210 U	120 U	NA	0.77 U
Isopropylbenzene	63 U	32 U	29 U	0.25 UJ	53 U	0.25 UJ	NA	41 U	40 U	41 U	32 U	74 U	210 U	120 U	NA	0.39 U
Methyl acetate	470 J	290 J	210 J	2.1 J	330 U	0.49 UJ	NA	140 J	1,300	1,200	110 J	720 J	5,000	420 J	NA	0.77 U
Methylcyclohexane	31 U	16 U	14 U	0.5 U	27 U	1.1 J	NA	20 U	20 U	21 U	16 U	37 U	100 U	58 U	NA	0.77 U
Methylene chloride	34 U	19 U	15 U	1.5 U	29 U	3.3 U	NA	27 J	30 U	24 U	24 U	46 U	120 U	91 J	NA	0.77 U
Methyl-tert-butyl ether (MTBE)	63 U	32 U	29 U	0.5 U	53 U	0.49 UJ	NA	41 U	40 U	41 U	32 U	74 U	210 U	120 U	NA	0.77 U
Styrene	63 U	32 U	29 U	0.25 U	53 U	0.25 UJ	NA	41 U	40 U	41 U	32 U	74 U	210 U	120 U	NA	0.39 U
Tetrachloroethene	31 U	16 U	14 U	0.5 U	27 U	0.49 UJ	NA	20 U	20 U	21 U	16 U	37 U	100 U	58 U	NA	0.77 U
Toluene	63 U	32 U	29 U	0.98 J	53 U	3 J	NA	41 U	40 U	41 U	32 U	74 U	210 U	120 U	NA	0.77 U
trans-1,2-Dichloroethene	31 U	16 U	14 U	0.25 U	27 U	0.25 UJ	NA	20 U	20 U	21 U	16 U	37 U	100 U	58 U	NA	0.39 U
trans-1,3-Dichloropropene	31 U	16 U	14 U	0.5 U	27 U	0.49 UJ	NA	20 U	20 U	21 U	16 U	37 U	100 U	58 U	NA	0.77 U
Trichloroethene	63 U	32 U	29 U	1.3 J	53 U	4.7 J	NA	41 U	40 U	41 U	32 U	74 U	210 U	120 U	NA	0.39 U
Trichlorofluoromethane (Freon-11)	63 U	39 J	29 U	0.25 U	53 U	0.25 UJ	NA	41 U	40 U	41 U	32 U	74 U	210 U	120 U	NA	0.39 U
Vinyl chloride	63 U	32 U	29 U	0.25 U	53 U	0.25 UJ	NA	41 U	40 U	41 U	32 U	74 U	210 U	120 U	NA	0.39 U
Xylene, total	130 U	64 U	57 U	0.76 U	110 U	0.74 UJ	NA	82 U	79 U	82 U	63 U	150 U	410 U	230 U	NA	1.2 U
Wet Chemistry																
Total organic carbon (TOC) (mg/kg)	18,000	17,000	4,900	9,600	19,000	14,000	36,000	NA	34,000	NA	15,000	97,000	180,000	NA	33,000	NA

Notes:

Shading indicates detections
NA - Not analyzed
J - Analyte present, value may or may not be accurate or precise
R - Unreliable Result
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
mg/kg - Milligrams per kilogram
µg/kg - Micrograms per kilogram

CTO-WE36
Camp Lejeune - Site 49
Validate Subsurface Soil Raw Analytical Results
April 2011

Station ID	IR49-MW01	IR49-MW02	IR49-MW03	IR49-MW04	IR49-MW05		IR49-MW06
Sample ID	IR49-SB09-3-4-11A	IR49-SB10-3-4-11A	IR49-SB11-2-3-11A	IR49-SB12-1_5-2-11A	IR49-SB13-1_5-2-11A	IR49-SB13D-1_5-2-11A	IR49-SB14-0_5-1-11A
Sample Date	03/31/11	03/31/11	03/31/11	03/31/11	03/31/11	04/01/11	03/31/11
Chemical Name							
Volatile Organic Compounds (µg/kg)							
1,1,1-Trichloroethane	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U
1,1,2,2-Tetrachloroethane	2.1	1.1 J	0.53 U	0.42 U	0.49 UJ	59 U	0.53 UJ
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U
1,1,2-Trichloroethane	1.9 J	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U
1,1-Dichloroethane	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	15 U	0.27 U
1,1-Dichloroethene	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U
1,2,4-Trichlorobenzene	0.51 U	0.51 U	0.53 U	0.42 U	0.49 UJ	30 U	0.53 UJ
1,2-Dibromo-3-chloropropane	0.51 U	0.51 U	0.53 U	0.42 U	0.49 UJ	30 U	0.53 UJ
1,2-Dibromoethane	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U
1,2-Dichlorobenzene	0.51 U	0.51 U	0.53 U	0.42 U	0.49 UJ	15 U	0.53 UJ
1,2-Dichloroethane	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	15 U	0.53 U
1,2-Dichloropropane	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U
1,3-Dichlorobenzene	0.26 U	0.25 U	0.26 U	0.21 U	0.24 UJ	15 U	0.27 UJ
1,4-Dichlorobenzene	0.26 U	0.25 U	0.26 U	0.21 U	0.24 UJ	30 U	0.27 UJ
2-Butanone	0.51 R	0.51 R	2.4 J	0.42 R	6.4 J	56 J	2.2 J
2-Hexanone	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U
4-Methyl-2-pentanone	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U
Acetone	11 R	12 R	46 J	12 R	35	120 U	48 J
Benzene	0.51 U	0.51 U	0.53 U	0.42 U	1.8	30 U	0.53 U
Bromodichloromethane	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	15 U	0.53 U
Bromoform	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	30 U	0.27 U
Bromomethane	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	59 U	0.53 U
Carbon disulfide	0.22 J	0.21 J	0.46 J	0.27 J	1.2	7.1 J	0.4 J
Carbon tetrachloride	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	15 U	0.27 U
Chlorobenzene	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	30 U	0.27 U
Chloroethane	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U
Chloroform	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	30 U	0.27 U
Chloromethane	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U
cis-1,2-Dichloroethene	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	30 U	0.27 U
cis-1,3-Dichloropropene	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	30 U	0.27 U
Cyclohexane	0.51 U	0.51 U	0.53 U	0.42 U	0.63 J	30 U	0.53 U
Dibromochloromethane	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U
Dichlorodifluoromethane (Freon-12)	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U
Ethylbenzene	0.51 U	0.51 U	0.53 U	0.42 U	3.3	30 U	0.53 U
Isopropylbenzene	0.26 U	0.25 U	0.26 U	0.21 U	0.24 UJ	30 U	0.27 UJ
Methyl acetate	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	120 J	0.53 U
Methylcyclohexane	0.51 U	0.51 U	0.53 U	0.42 U	1 J	15 U	0.53 U
Methylene chloride	2 U	1.9 U	1.7 U	1.9 U	2.2 U	15 U	1.7 U
Methyl-tert-butyl ether (MTBE)	0.51 UJ	0.51 UJ	0.53 UJ	0.42 UJ	0.49 UJ	30 U	0.53 UJ
Styrene	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	30 U	0.27 U
Tetrachloroethene	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	15 U	0.53 U
Toluene	0.51 U	0.51 U	0.53 U	0.42 U	3.1	30 U	0.34 J
trans-1,2-Dichloroethene	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	15 U	0.27 U
trans-1,3-Dichloropropene	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	15 U	0.53 U
Trichloroethene	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	30 U	0.27 U
Trichlorofluoromethane (Freon-11)	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	30 U	0.27 U
Vinyl chloride	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	30 U	0.27 U
Xylene, total	0.77 U	0.76 U	0.79 U	0.62 U	0.73 U	59 U	0.8 U
Wet Chemistry							
Total organic carbon (TOC) (mg/kg)	5,200	1,600	1,300	1,500	1,600	NA	8,400

Notes:

Shading indicates detections

NA - Not analyzed

J - Analyte present, value may or may not be accurate or precise

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

mg/kg - Milligrams per kilogram

µg/kg - Micrograms per kilogram

CTO-WE36
Camp Lejeune - Site 49
Validated Surface Water Raw Analytical Results
March 2011

Station ID	IR49-SD01/SW01	IR49-SD02/SW02		IR49-SD03/SW03
Sample ID	IR49-SW01-11A	IR49-SW02-11A	IR49-SW02D-11A	IR49-SW03-11A
Sample Date	03/29/11	03/29/11	03/29/11	03/29/11
Chemical Name				
Volatile Organic Compounds (µg/l)				
1,1,1-Trichloroethane	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2,2-Tetrachloroethane	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-Trichloroethane	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethane	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethene	0.5 U	0.5 U	0.5 U	0.5 U
1,2,4-Trichlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dibromo-3-chloropropane	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dibromoethane	0.25 U	0.25 U	0.25 U	0.25 U
1,2-Dichlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloroethane	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloropropane	0.5 U	0.5 U	0.5 U	0.5 U
1,3-Dichlorobenzene	0.25 U	0.25 U	0.25 U	0.25 U
1,4-Dichlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U
2-Butanone	0.5 U	0.5 U	0.5 U	0.5 U
2-Hexanone	0.5 U	0.5 U	0.5 U	0.5 U
4-Methyl-2-pentanone	0.5 U	0.5 U	0.5 U	0.5 U
Acetone	3.6 U	4.3 U	6.9 U	6.3 U
Benzene	0.5 U	0.5 U	0.5 U	0.5 U
Bromodichloromethane	1	0.5 U	0.5 U	0.5 U
Bromoform	0.25 U	0.25 U	0.25 U	0.25 U
Bromomethane	0.5 U	0.5 U	0.5 U	0.5 U
Carbon disulfide	0.5 U	0.5 U	0.5 U	0.5 U
Carbon tetrachloride	0.5 U	0.5 U	0.5 U	0.5 U
Chlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U
Chloroethane	0.5 U	0.5 U	0.5 U	0.5 U
Chloroform	1.7	0.5 U	0.5 U	0.5 U
Chloromethane	0.5 U	0.5 U	0.5 U	0.5 U
cis-1,2-Dichloroethene	0.5 U	0.5 U	0.5 U	0.5 U
cis-1,3-Dichloropropene	0.1 U	0.1 U	0.1 U	0.1 U
Cyclohexane	0.5 U	0.5 U	0.5 U	0.5 U
Dibromochloromethane	4	0.25 U	0.25 U	0.25 U
Dichlorodifluoromethane (Freon-12)	0.5 U	0.5 U	0.5 U	0.5 U
Ethylbenzene	0.25 U	0.25 U	0.25 U	0.25 U
Isopropylbenzene	0.5 U	0.5 U	0.5 U	0.5 U
Methyl acetate	0.66 U	0.5 U	0.5 U	0.5 U
Methylcyclohexane	0.5 U	0.5 U	0.5 U	0.5 U
Methylene chloride	0.5 U	0.5 U	0.5 U	0.5 U
Methyl-tert-butyl ether (MTBE)	0.5 U	0.5 U	0.5 U	0.5 U
Styrene	0.1 U	0.1 U	0.1 U	0.1 U
Tetrachloroethene	0.5 U	0.5 U	0.5 U	0.5 U
Toluene	0.1 U	0.1 U	0.1 U	0.1 U
trans-1,2-Dichloroethene	0.5 U	0.5 U	0.5 U	0.5 U
trans-1,3-Dichloropropene	0.25 U	0.25 U	0.25 U	0.25 U
Trichloroethene	0.5 U	0.5 U	0.5 U	0.5 U
Trichlorofluoromethane (Freon-11)	0.5 U	0.5 U	0.5 U	0.5 U
Vinyl chloride	0.5 U	0.5 U	0.5 U	0.5 U
Xylene, total	0.75 U	0.75 U	0.75 U	0.75 U
Wet Chemistry				
Total organic carbon (TOC) (ug/l)	4,300	13,000	NA	3,900

Notes:

Shading indicates detections

NA - Not analyzed

U - The material was analyzed for, but not detected

µg/l - Micrograms per liter

Station ID	IR49-SD01/SW01	IR49-SD02/SW02		IR49-SD03/SW03	IR49-SD04/PW01		IR49-SD05/PW02	IR49-SD06/PW03	
Sample ID	IR49-SD01-11A	IR49-SD02-11A	IR49-SD02D-11A	IR49-SD03-11A	IR49-SD04-11A	IR49-SD04-11B	IR49-SD05-11A	IR49-SD06-11A	IR49-SD06-11B
Sample Date	03/29/11	03/29/11	03/29/11	03/29/11	03/30/11	04/18/11	03/30/11	03/30/11	04/18/11
Chemical Name									
Volatile Organic Compounds (µg/kg)									
1,1,1-Trichloroethane	0.59 U	330 U	110 U	42 U	NA	0.52 U	120 U	NA	53 U
1,1,2,2-Tetrachloroethane	0.59 UJ	660 U	220 U	83 U	NA	0.52 U	230 U	NA	110 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	0.59 U	330 U	110 U	42 U	NA	0.52 U	120 U	NA	53 U
1,1,2-Trichloroethane	0.59 U	330 U	110 U	42 U	NA	0.52 U	120 U	NA	53 U
1,1-Dichloroethane	0.29 U	170 U	55 U	21 U	NA	0.26 U	58 U	NA	27 U
1,1-Dichloroethene	0.59 U	330 U	110 U	42 U	NA	0.52 U	120 U	NA	53 U
1,2,4-Trichlorobenzene	0.59 UJ	330 U	110 U	42 U	NA	0.52 U	120 U	NA	53 U
1,2-Dibromo-3-chloropropane	0.59 UJ	330 U	110 U	42 U	NA	0.52 U	120 U	NA	53 U
1,2-Dibromoethane	0.59 U	330 U	110 U	42 U	NA	0.52 U	120 U	NA	53 U
1,2-Dichlorobenzene	0.59 UJ	170 U	55 U	21 U	NA	0.52 U	58 U	NA	27 U
1,2-Dichloroethane	0.59 U	170 U	55 U	21 U	NA	0.52 U	58 U	NA	27 U
1,2-Dichloropropane	0.59 U	330 U	110 U	42 U	NA	0.52 U	120 U	NA	53 U
1,3-Dichlorobenzene	0.29 UJ	170 U	55 U	21 U	NA	0.26 U	58 U	NA	27 U
1,4-Dichlorobenzene	0.29 UJ	330 U	110 U	42 U	NA	0.26 U	120 U	NA	53 U
2-Butanone	10 J	660 U	220 U	57 J	NA	3.4 J	230 U	NA	110 U
2-Hexanone	0.59 U	330 U	110 U	42 U	NA	0.52 U	120 U	NA	53 U
4-Methyl-2-pentanone	0.59 U	330 U	110 U	42 U	NA	0.52 U	120 U	NA	53 U
Acetone	300 J	1,400 U	440 U	270 U	NA	28 J	460 U	NA	210 U
Benzene	1.3	330 U	110 U	42 U	NA	0.46 J	120 U	NA	53 U
Bromodichloromethane	0.59 U	170 U	55 U	21 U	NA	0.52 U	58 U	NA	27 U
Bromoform	0.29 U	330 U	110 U	42 U	NA	0.26 U	120 U	NA	53 U
Bromomethane	0.59 U	660 U	220 U	83 U	NA	0.52 U	230 U	NA	110 U
Carbon disulfide	1.3	93 J	31 J	82 J	NA	8.1	46 J	NA	27 U
Carbon tetrachloride	0.29 U	170 U	55 U	21 U	NA	0.26 U	58 U	NA	27 U
Chlorobenzene	0.29 U	330 U	110 U	42 U	NA	0.26 U	120 U	NA	53 U
Chloroethane	0.59 U	330 U	110 U	42 U	NA	0.52 U	120 U	NA	53 U
Chloroform	0.29 U	330 U	110 U	42 U	NA	0.26 U	120 U	NA	53 U
Chloromethane	0.59 U	330 U	110 U	42 U	NA	0.52 U	120 U	NA	53 U
cis-1,2-Dichloroethene	0.29 U	330 U	110 U	42 U	NA	0.26 U	120 U	NA	53 U
cis-1,3-Dichloropropene	0.29 U	330 U	110 U	42 U	NA	0.26 U	120 U	NA	53 U
Cyclohexane	0.93 J	330 U	110 U	42 U	NA	0.52 U	120 U	NA	53 U
Dibromochloromethane	0.59 U	330 U	110 U	42 U	NA	0.52 U	120 U	NA	53 U
Dichlorodifluoromethane (Freon-12)	0.59 U	330 U	110 U	42 U	NA	0.37 J	120 U	NA	53 U
Ethylbenzene	0.59 U	330 U	110 U	42 U	NA	0.31 J	120 U	NA	53 U
Isopropylbenzene	0.29 UJ	330 U	110 U	42 U	NA	0.26 U	120 U	NA	53 U
Methyl acetate	8.2	1,900 J	520 J	1,300	NA	0.52 U	700 J	NA	140 J
Methylcyclohexane	0.99 J	170 U	55 U	21 U	NA	0.52 U	58 U	NA	27 U
Methylene chloride	7.3 U	170 U	62 U	22 U	NA	0.54 J	69 U	NA	27 U
Methyl-tert-butyl ether (MTBE)	0.59 U	330 U	110 U	42 U	NA	0.52 U	120 U	NA	53 U
Styrene	0.29 U	330 U	110 U	42 U	NA	0.26 U	120 U	NA	53 U
Tetrachloroethene	0.59 J	170 U	55 U	21 U	NA	0.52 U	58 U	NA	27 U
Toluene	3.7	330 U	110 U	42 U	NA	0.6 J	120 U	NA	53 U
trans-1,2-Dichloroethene	0.29 U	170 U	55 U	21 U	NA	0.26 U	58 U	NA	27 U
trans-1,3-Dichloropropene	0.59 U	170 U	55 U	21 U	NA	0.52 U	58 U	NA	27 U
Trichloroethene	0.29 U	330 U	110 U	42 U	NA	0.26 U	120 U	NA	53 U
Trichlorofluoromethane (Freon-11)	0.29 U	330 U	110 U	42 U	NA	0.26 U	120 U	NA	53 U
Vinyl chloride	0.29 U	330 U	110 U	42 U	NA	0.26 U	120 U	NA	53 U
Xylene, total	3 J	660 U	220 U	83 U	NA	0.78 U	230 U	NA	110 U
Wet Chemistry									
Total organic carbon (TOC) (mg/kg)	9,700	160,000	NA	14,000	3,900	NA	32,000	21,000	NA

Notes:

Shading indicates detections
NA - Not analyzed
J - Analyte present, value may or may not be accurate or precise
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
mg/kg - Milligrams per kilogram
µg/kg - Micrograms per kilogram

CTO-WE36
Camp Lejeune - Site 49
Validated Porewater Raw Analytical Results
March 2011

Station ID	IR49-SD04/PW01	IR49-SD05/PW02		IR49-SD06/PW03
Sample ID	IR49-PW01-11A	IR49-PW02-11A	IR49-PW02D-11A	IR49-PW03-11A
Sample Date	04/02/11	04/01/11	04/01/11	04/01/11
Chemical Name				
Volatile Organic Compounds (µg/l)				
1,1,1-Trichloroethane	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2,2-Tetrachloroethane	0.19 J	0.5 U	0.5 U	0.5 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-Trichloroethane	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethane	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethene	0.5 U	0.5 U	0.5 U	0.5 U
1,2,4-Trichlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dibromo-3-chloropropane	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dibromoethane	0.25 U	0.25 U	0.25 U	0.25 U
1,2-Dichlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloroethane	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloropropane	0.5 U	0.5 U	0.5 U	0.5 U
1,3-Dichlorobenzene	0.25 U	0.25 U	0.25 U	0.25 U
1,4-Dichlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U
2-Butanone	2.6 J	0.82 J	0.84 J	0.5 U
2-Hexanone	0.5 U	0.5 U	0.5 U	0.5 U
4-Methyl-2-pentanone	0.5 U	0.5 U	0.5 U	0.5 U
Acetone	100	6.2 U	7.6 U	5.6 U
Benzene	0.5 U	0.5 U	0.5 U	0.5 U
Bromodichloromethane	0.5 U	0.5 U	0.5 U	0.5 U
Bromoform	0.25 U	0.25 U	0.25 U	0.25 U
Bromomethane	0.5 U	0.5 U	0.5 U	0.5 U
Carbon disulfide	0.39 J	0.5 U	0.5 U	0.21 J
Carbon tetrachloride	0.5 U	0.5 U	0.5 U	0.5 U
Chlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U
Chloroethane	0.5 U	0.5 U	0.5 U	0.5 U
Chloroform	0.5 U	0.5 U	0.5 U	0.5 U
Chloromethane	0.5 U	0.5 U	0.5 U	0.5 U
cis-1,2-Dichloroethene	2.5	0.5 U	0.5 U	0.5 U
cis-1,3-Dichloropropene	0.1 U	0.1 U	0.1 U	0.1 U
Cyclohexane	0.5 U	0.5 U	0.5 U	0.5 U
Dibromochloromethane	0.25 U	0.25 U	0.25 U	0.25 U
Dichlorodifluoromethane (Freon-12)	0.5 U	0.5 U	0.5 U	0.5 U
Ethylbenzene	0.25 U	0.25 U	0.25 U	0.25 U
Isopropylbenzene	0.5 U	0.5 U	0.5 U	0.5 U
Methyl acetate	0.97 J	0.5 U	0.75 J	0.5 U
Methylcyclohexane	0.5 U	0.5 U	0.5 U	0.5 U
Methylene chloride	0.5 U	0.5 U	0.5 U	0.5 U
Methyl-tert-butyl ether (MTBE)	0.5 U	0.5 U	0.5 U	0.5 U
Styrene	0.1 U	0.1 U	0.1 U	0.1 U
Tetrachloroethene	0.5 U	0.5 U	0.5 U	0.5 U
Toluene	0.1 U	0.1 U	0.1 U	0.1 U
trans-1,2-Dichloroethene	1.9	0.5 U	0.5 U	0.5 U
trans-1,3-Dichloropropene	0.25 U	0.25 U	0.25 U	0.25 U
Trichloroethene	1.1	0.5 U	0.5 U	0.5 U
Trichlorofluoromethane (Freon-11)	0.5 U	0.5 U	0.5 U	0.5 U
Vinyl chloride	0.3 J	0.5 U	0.5 U	0.5 U
Xylene, total	0.75 U	0.75 U	0.75 U	0.75 U
Wet Chemistry				
Total organic carbon (TOC) (ug/l)	3,100	17,000	NA	5,700

Notes:

Shading indicates detections

NA - Not analyzed

J - Analyte present, value may or may not be accurate or precise

U - The material was analyzed for, but not detected

µg/l - Micrograms per liter

CTO-WE36
Camp Lejeune - Site 49
Validated Groundwater Raw Analytical Result
August 2011

Station ID	IR49-MW01			IR49-MW02		IR49-MW03		IR49-MW04		IR49-MW05		IR49-MW06	
Sample ID	IR49-GW01-11A	IR49-GW01-11C	IR49-GW01D-11C	IR49-GW02-11A	IR49-GW02-11C	IR49-GW03-11A	IR49-GW03-11C	IR49-GW04-11A	IR49-GW04-11C	IR49-GW05-11A	IR49-GW05-11C	IR49-GW06-11A	IR49-GW06-11C
Sample Date	04/01/11	08/04/11	08/04/11	04/01/11	08/03/11	04/02/11	08/04/11	04/01/11	08/03/11	04/01/11	08/03/11	04/01/11	08/03/11
Chemical Name													
Volatile Organic Compounds (µg/l)													
1,1,1-Trichloroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2,2-Tetrachloroethane	1	0.46 J	0.46 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-Trichloroethane	0.81 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,4-Trichlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dibromo-3-chloropropane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dibromoethane	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
1,2-Dichlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloropropane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,3-Dichlorobenzene	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
1,4-Dichlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
2-Butanone	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
2-Hexanone	0.5 U	0.5 UJ	0.5 UJ	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 U	0.5 UJ
4-Methyl-2-pentanone	0.5 U	0.5 UJ	0.5 UJ	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 U	0.5 UJ
Acetone	1.8 U	1 U	1 U	2.7 U	1 U	3.9 U	1 U	4.4 U	1 U	2.2 U	1 U	3.7 U	1 U
Benzene	1	0.61 J	0.62 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromodichloromethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromoform	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Bromomethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Carbon disulfide	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Carbon tetrachloride	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloroform	0.5 U	0.5 U	0.5 U	0.25 J	0.5 U	0.55 J	0.5 U	0.5 U	0.5 U	0.28 J	0.5 U	0.34 J	0.5 U
Chloromethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
cis-1,2-Dichloroethene	70	42	42	2.8	2.3	0.5 U	0.5 U	0.38 J	2.4	0.31 J	0.3 J	0.61 J	0.32 J
cis-1,3-Dichloropropene	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Cyclohexane	0.31 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dibromochloromethane	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Dichlorodifluoromethane (Freon-12)	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Ethylbenzene	0.13 J	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Isopropylbenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methyl acetate	0.5 U	0.5 UJ	0.5 UJ	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 U	0.5 UJ
Methylcyclohexane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methylene chloride	0.5 U	0.93 U	0.87 U	0.5 U	0.83 U	0.5 U	0.5 UJ	0.5 U	0.83 U	0.5 U	1.1 U	0.5 U	0.8 U
Methyl-tert-butyl ether (MTBE)	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Styrene	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Tetrachloroethene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Toluene	0.28 J	0.2 J	0.19 J	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
trans-1,2-Dichloroethene	19	9.9	10	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.35 J	0.5 U	0.5 U	0.5 U	0.5 U
trans-1,3-Dichloropropene	0.25 U	0.25 UJ	0.25 UJ	0.25 U	0.25 UJ	0.25 U	0.25 UJ	0.25 U	0.25 UJ	0.25 U	0.25 UJ	0.25 U	0.25 UJ
Trichloroethene	100	58	58	0.28 J	0.23 J	0.5 U	0.5 U	0.5 U	0.26 J	0.5 U	0.5 U	0.5 U	0.5 U
Trichlorofluoromethane (Freon-11)	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Vinyl chloride	2	1.4	1.4	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Xylene, total	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
Total Metals (µg/l)													
Iron	NA	2,000	NA	NA	1,800	NA	14,000	NA	4,800	NA	2,900	NA	3,100

CTO-WE36
Camp Lejeune - Site 49
Validated Groundwater Raw Analytical Result
August 2011

Station ID	IR49-MW01			IR49-MW02		IR49-MW03		IR49-MW04		IR49-MW05		IR49-MW06	
Sample ID	IR49-GW01-11A	IR49-GW01-11C	IR49-GW01D-11C	IR49-GW02-11A	IR49-GW02-11C	IR49-GW03-11A	IR49-GW03-11C	IR49-GW04-11A	IR49-GW04-11C	IR49-GW05-11A	IR49-GW05-11C	IR49-GW06-11A	IR49-GW06-11C
Sample Date	04/01/11	08/04/11	08/04/11	04/01/11	08/03/11	04/02/11	08/04/11	04/01/11	08/03/11	04/01/11	08/03/11	04/01/11	08/03/11
Chemical Name													
Wet Chemistry													
Alkalinity (ug/l)	NA	130,000	NA	NA	150,000	NA	34,000	NA	39,000	NA	94,000	NA	93,000
Chloride (ug/l)	NA	15,000	NA	NA	14,000	NA	22,000	NA	17,000	NA	11,000	NA	12,000
Ethane (ug/l)	NA	0.91 U	NA	NA	0.91 U	NA	0.91 U	NA	0.91 U	NA	0.91 U	NA	0.91 U
Ethene (ug/l)	NA	0.84 U	NA	NA	0.84 U	NA	0.84 U	NA	0.84 U	NA	0.84 U	NA	0.84 U
Methane (ug/l)	NA	180	NA	NA	110	NA	140	NA	190	NA	85	NA	140
Sulfate (ug/l)	NA	1,000 U	NA	NA	10,000	NA	24,000	NA	40,000	NA	54,000	NA	8,800
Sulfide (ug/l)	NA	1,000 U	NA	NA	1,000 U	NA	1,000 U	NA	1,000 U	NA	1,000 U	NA	1,000 U
Total organic carbon (TOC) (ug/l)	980	990	NA	1,100	1,000	2,600	3,000	2,200	1,400	1,100	1,000	970	990
Dechlorinating Bacteria (gc/ml)													
Dehalococcoides	NA	0.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Functional Genes (gc/ml)													
BAV1 R-Dase	NA	0.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TCE R-Dase	NA	0.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VC R-Dase	NA	0.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

Shading indicates detections

NA - Not analyzed

J - Analyte present, value may or may not be accurate or precise

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

gc/ml - Gene copies per milliliter

µg/l - Micrograms per liter

CTO-WE36
Camp Lejeune - Site 49
Validated Groundwater Raw Analytical Result
August 2011

Station ID	IR49-MW07			IR49-MW08	
Sample ID	IR49-GW07-11A	IR49-GW07D-11A	IR49-GW07-11C	IR49-GW08-11A	IR49-GW08-11C
Sample Date	04/02/11	04/02/11	08/04/11	04/02/11	08/04/11
Chemical Name					
Volatile Organic Compounds (µg/l)					
1,1,1-Trichloroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2,2-Tetrachloroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-Trichloroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,4-Trichlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dibromo-3-chloropropane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dibromoethane	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
1,2-Dichlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloropropane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,3-Dichlorobenzene	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
1,4-Dichlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
2-Butanone	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
2-Hexanone	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 UJ
4-Methyl-2-pentanone	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 UJ
Acetone	4.6 U	2.4 U	1 U	5.3 U	1 U
Benzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromodichloromethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromoform	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Bromomethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Carbon disulfide	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Carbon tetrachloride	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloroform	0.5 U	0.5 U	0.5 U	0.39 J	0.5 U
Chloromethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
cis-1,2-Dichloroethene	0.4 J	0.41 J	0.34 J	0.5 U	0.5 U
cis-1,3-Dichloropropene	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Cyclohexane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dibromochloromethane	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Dichlorodifluoromethane (Freon-12)	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Ethylbenzene	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Isopropylbenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methyl acetate	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 UJ
Methylcyclohexane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methylene chloride	0.5 U	0.5 U	0.96 U	0.5 U	0.84 U
Methyl-tert-butyl ether (MTBE)	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Styrene	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Tetrachloroethene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Toluene	0.1 U	0.1 U	0.09 J	0.1 J	0.1 U
trans-1,2-Dichloroethene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
trans-1,3-Dichloropropene	0.25 U	0.25 U	0.25 UJ	0.25 U	0.25 UJ
Trichloroethene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichlorofluoromethane (Freon-11)	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Vinyl chloride	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Xylene, total	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
Total Metals (µg/l)					
Iron	NA	NA	2,400	NA	400

CTO-WE36
Camp Lejeune - Site 49
Validated Groundwater Raw Analytical Result
August 2011

Station ID	IR49-MW07			IR49-MW08	
Sample ID	IR49-GW07-11A	IR49-GW07D-11A	IR49-GW07-11C	IR49-GW08-11A	IR49-GW08-11C
Sample Date	04/02/11	04/02/11	08/04/11	04/02/11	08/04/11
Chemical Name					
Wet Chemistry					
Alkalinity (ug/l)	NA	NA	230,000	NA	200,000
Chloride (ug/l)	NA	NA	13,000	NA	11,000
Ethane (ug/l)	NA	NA	0.91 U	NA	0.91 U
Ethene (ug/l)	NA	NA	0.84 U	NA	0.84 U
Methane (ug/l)	NA	NA	40	NA	19
Sulfate (ug/l)	NA	NA	5,600	NA	26,000
Sulfide (ug/l)	NA	NA	1,000 U	NA	1,000 U
Total organic carbon (TOC) (ug/l)	1,600	NA	1,100	1,800	1,200
Dechlorinating Bacteria (gc/ml)					
Dehalococcoides	NA	NA	0.5 U	NA	NA
Functional Genes (gc/ml)					
BAV1 R-Dase	NA	NA	0.5 U	NA	NA
TCE R-Dase	NA	NA	0.5 U	NA	NA
VC R-Dase	NA	NA	0.5 U	NA	NA

Notes:

Shading indicates detections
NA - Not analyzed
J - Analyte present, value may or may not be accurate or pre
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccura
gc/ml - Gene copies per milliliter
µg/l - Micrograms per liter

SAMPLE ID SUMMARY
ASTM D422-63(07)

Laboratory: TriMatrix Laboratories, Inc. SDG: 50069-11

Client: CH2M HILL - VA Project: CH2M HILL MCB Camp Lejeune CTO-WE36 :

Client Sample Id:	Lab Sample Id:
IR49-MW06-15-16-11A	1104048-20
IR49-MW08-35-37-11A	1104048-21
IR49-MW01-14-16-11A	1104048-22
IR49-MW06-14-15-11A	1104048-23

GRAIN SIZE DISTRIBUTION TEST DATA

4/20/2011

Location: IR49
Sample Number: 1104048-20 h
Material Description: Dark gray clay
Sample Date: 03/29/11
Testing Remarks: Testing Procedure: ASTM D422-63(07)
Percent Moisuure: ~~82.0%~~ 18%
Weight Dry Solids 139.84 (grams):
Tested By: MAS
Checked By: JMF

Hydrometer Test Data

Hydrometer test uses material passing #10
Percent passing #10 based upon complete sample = 90.2 ✓
Weight of hydrometer sample = 50.08 ✓
Hygroscopic moisture correction:
Moist weight and tare = 10.12 ✓
Dry weight and tare = 10.04 ✓
Tare weight = 0.00
Hygroscopic moisture = 0.8%
Table of composite correction values:

Temp., deg. C:	19.9	20.0	20.1	20.6	20.7
Comp. corr.:	-5.0	-5.0	-5.0	-4.0	-5.0

Meniscus correction only = 0.0
Specific gravity of solids = 2.65
Hydrometer type = 151H
Hydrometer effective depth equation: L = 16.294964 - 0.2645 **x Rm**

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
2.00 ✓	23.3 ✓	1.0070 ✓	1.0020	0.0131	7.0	14.4	0.0352	6.4
5.00 ✓	20.2 ✓	1.0070 ✓	1.0022	0.0136	7.0	14.4	0.0231	7.1
15.00 ✓	20.2 ✓	1.0070 ✓	1.0022	0.0136	7.0	14.4	0.0134	7.1
30.00 ✓	20.1 ✓	1.0060 ✓	1.0010	0.0136	6.0	14.7	0.0095	3.2
60.00 ✓	20.1 ✓	1.0060 ✓	1.0010	0.0136	6.0	14.7	0.0067	3.2
240.00 ✓	20.8 ✓	1.0060 ✓	1.0010	0.0135	6.0	14.7	0.0033	3.2
1440.00 ✓	20.6 ✓	1.0060 ✓	1.0020	0.0135	6.0	14.7	0.0014	6.4

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
									3.2	

D_{10}	D_{15}	D_{20}	D_{30}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}

TriMatrix Laboratories

GRAIN SIZE DISTRIBUTION TEST DATA

4/20/2011

Location: IR49

Sample Number: 1104048-21 h

Material Description: Light gray clay

Sample Date: 3/31/11

Testing Remarks: Testing Procedure: ASTM D422-63(07)

Percent Moisuure: ~~82.6%~~ 17.4

Weight Dry Solids (grams): 96.29

Tested By: MAS

Checked By: JMF

Hydrometer Test Data

Hydrometer test uses material passing #10
Percent passing #10 based upon complete sample = 80.8
Weight of hydrometer sample =50.63
Hygroscopic moisture correction:
Moist weight and tare = 10.17
Dry weight and tare = 8.90
Tare weight = 0.00
Hygroscopic moisture = 14.3%
Table of composite correction values:

Temp., deg. C:	19.9	20.0	20.1	20.6	20.7
Comp. corr.:	-5.0	-5.0	-5.0	-4.0	-5.0

Meniscus correction only = 0.0
Specific gravity of solids = 2.65
Hydrometer type = 151H
Hydrometer effective depth equation: L = 16.294964 - 0.2645 **x Rm**

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
2.00	20.1 20.2	1.0130	1.0080	0.0136	13.0	12.9	0.0346	23.4
5.00	20.2	1.0120	1.0072	0.0136	12.0	13.1	0.0220	21.1
15.00	20.2	1.0110	1.0062	0.0136	11.0	13.4	0.0129	18.2
30.00	20.1	1.0110	1.0060	0.0136	11.0	13.4	0.0091	17.6
60.00	20.2	1.0100	1.0052	0.0136	10.0	13.6	0.0065	15.2
240.00	20.7	1.0070	1.0020	0.0135	7.0	14.4	0.0033	5.9
1440.00	20.5	1.0060	1.0018	0.0136	6.0	14.7	0.0014	5.3

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
									11.6	

D_{10}	D_{15}	D_{20}	D_{30}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
0.0045	0.0064	0.0186							

GRAIN SIZE DISTRIBUTION TEST DATA

4/20/2011

Location: IR49

Sample Number: 1104047-22 h

Material Description: Dark gray clay (very slow drying)

Sample Date: 3/30/11

Testing Remarks: Testing Procedure: ASTM D422-63(07)
Percent Moisuure: ~~81.5%~~ 181
Weight Dry Solids (grams): 133.59

Tested By: MAS

Checked By: JMF

Hydrometer Test Data

Hydrometer test uses material passing #10
Percent passing #10 based upon complete sample = 86.9
Weight of hydrometer sample =50.09
Hygroscopic moisture correction:
Moist weight and tare = 10.94
Dry weight and tare = 9.07
Tare weight = 0.00
Hygroscopic moisture = 20.6%
Table of composite correction values:

Temp., deg. C:	19.9	20.0	20.1	20.6	20.7
Comp. corr.:	-5.0	-5.0	-5.0	-4.0	-5.0

Meniscus correction only = 0.0
Specific gravity of solids = 2.65
Hydrometer type = 151H
Hydrometer effective depth equation: L = 16.294964 - 0.2645 **x Rm**

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
2.00	20.2	1.0130	1.0082	0.0136	13.0	12.9	0.0345	27.6
5.00	20.2	1.0120	1.0072	0.0136	12.0	13.1	0.0220	24.2
15.00	20.2	1.0110	1.0062	0.0136	11.0	13.4	0.0129	20.8
30.00	20.1	1.0110	1.0060	0.0136	11.0	13.4	0.0091	20.2
60.00	20.2	1.0100	1.0052	0.0136	10.0	13.6	0.0065	17.5
240.00	20.7	1.0070	1.0020	0.0135	7.0	14.4	0.0033	6.7
1440.00	20.5	1.0060	1.0018	0.0136	6.0	14.7	0.0014	6.0

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
									13.3	

D_{10}	D_{15}	D_{20}	D_{30}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
0.0041	0.0055	0.0087							

GRAIN SIZE DISTRIBUTION TEST DATA

4/20/2011

Location: IR49

Sample Number: 1104047-23h

Material Description: Almost black clay

Sample Date: 3/29/11

Testing Remarks: Testing Procedure: ASTM D422-63(07)
Percent Moisuure: ~~64.3~~ 35.7
Weight Dry Solids (grams):100.01

Tested By: MAS

Checked By: JMF

Hydrometer Test Data

Hydrometer test uses material passing #10
Percent passing #10 based upon complete sample = 80.7
Weight of hydrometer sample =50.36
Hygroscopic moisture correction:
Moist weight and tare = 10.44
Dry weight and tare = 10.24
Tare weight = 0.00
Hygroscopic moisture = 2.0%
Table of composite correction values:

Temp., deg. C:	19.9	20.0	20.1	20.6	20.7
Comp. corr.:	-5.0	-5.0	-5.0	-4.0	-5.0

Meniscus correction only = 0.0
Specific gravity of solids = 2.65
Hydrometer type = 151H
Hydrometer effective depth equation: L = 16.294964 - 0.2645 **x Rm**

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
2.00	20.4	1.0160	1.0116	0.0136	16.0	12.1	0.0333	30.4
5.00	20.6	1.0140	1.0100	0.0135	14.0	12.6	0.0215	26.2
15.00	20.5	1.0140	1.0098	0.0136	14.0	12.6	0.0124	25.7
30.00	20.5	1.0130	1.0088	0.0136	13.0	12.9	0.0089	23.1
60.00	20.5	1.0120	1.0078	0.0136	12.0	13.1	0.0063	20.5
240.00	20.9	1.0100	1.0050	0.0135	10.0	13.6	0.0032	13.1
1440.00	20.6	1.0090	1.0050	0.0135	9.0	13.9	0.0013	13.1

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
									17.9	

D_{10}	D_{15}	D_{20}	D_{30}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
	0.0039	0.0060	0.0322						

TABLE 7.1
Samples Used in the Risk Assessment
Rememdial Investigation - Site 49
MCB CamLej, Jacksonville, North Carolina

Medium	Date of Sampling	Sample Location	Sample	Parameters
Surface Soil				
	3/29/2011	IR49-SS02	IR49-SS02-11A	VOCs
	3/29/2011	IR49-SS03	IR49-SS03-11A	VOCs
	3/29/2011	IR49-SS04	IR49-SS04-11A	VOCs
	3/29/2011	IR49-SS05	IR49-SS05-11A	VOCs
	3/29/2011	IR49-SS06	IR49-SS06-11A	VOCs
	3/29/2011	IR49-SS07	IR49-SS07-11A	VOCs
	4/18/2011	IR49-SS08	IR49-SS08-11B	VOCs
	3/28/2011	IR49-SS09	IR49-SS09-11A	VOCs
	3/28/2011	IR49-SS09	IR49-SS09D-11A[1]	VOCs
	3/28/2011	IR49-SS10	IR49-SS10-11A	VOCs
	3/28/2011	IR49-SS11	IR49-SS11-11A	VOCs
	3/28/2011	IR49-SS12	IR49-SS12-11A	VOCs
	4/18/2011	IR49-SS12	IR49-SS12D-11B	VOCs
	4/18/2011	IR49-SS13	IR49-SS13-11B	VOCs
Surface Water				
Surface Water	3/29/2011	IR49-SD02/SW02	IR49-SW02-11A	VOCs
Drainage Ditches	3/29/2011	IR49-SD02/SW02	IR49-SW02D-11A[1]	VOCs
	3/29/2011	IR49-SD03/SW03	IR49-SW03-11A	VOCs
Pore Water	4/2/2011	IR49-SD04/PW01	IR49-PW01-11A	VOCs
New River	4/1/2011	IR49-SD05/PW02	IR49-PW02-11A	VOCs
	4/1/2011	IR49-SD05/PW02	IR49-PW02D-11A[1]	VOCs
	4/1/2011	IR49-SD06/PW03	IR49-PW03-11A	VOCs
Sediment				
Drainage Dtiches	3/29/2011	IR49-SD02/SW02	IR49-SD02-11A	VOCs
	3/29/2011	IR49-SD02/SW02	IR49-SD02D-11A[1]	VOCs
	3/29/2011	IR49-SD03/SW03	IR49-SD03-11A	VOCs
New River	4/18/2011	IR49-SD04/PW01	IR49-SD04-11B	VOCs
	3/30/2011	IR49-SD05/PW02	IR49-SD05-11A	VOCs
	4/18/2011	IR49-SD06/PW03	IR49-SD06-11B	VOCs
Subsurface Soil				
	7/08/2009	IR49-IS01	IR49-IS01-7-8-09C	VOCs, SVOCs, Metals
	7/08/2009	IR49-IS01	IR49-IS01D-7-8-09C[1]	VOCs, SVOCs, Metals
	7/09/2009	IR49-IS02	IR49-IS02-6-7-09C	VOCs, SVOCs, Metals
	3/31/2011	IR49-MW01	IR49-SB09-3-4-11A	VOCs
	3/31/2011	IR49-MW02	IR49-SB10-3-4-11A	VOCs
	3/31/2011	IR49-MW03	IR49-SB11-2-3-11A	VOCs
	3/31/2011	IR49-MW04	IR49-SB12-1_5-2-11A	VOCs
	3/31/2011	IR49-MW05	IR49-SB13-1_5-2-11A	VOCs
	4/01/2011	IR49-MW05	IR49-SB13D-1_5-2-11A	VOCs
	3/31/2011	IR49-MW06	IR49-SB14-0_5-1-11A	VOCs

TABLE 7.1
Samples Used in the Risk Assessment
Rememdial Investigation - Site 49
MCB CamLej, Jacksonville, North Carolina

Medium	Date of Sampling	Sample Location	Sample	Parameters
Groundwater				
	4/01/2011	IR49-MW01	IR49-GW01-11A[2]	VOCs
	4/01/2011	IR49-MW02	IR49-GW02-11A[2]	VOCs
	4/02/2011	IR49-MW03	IR49-GW03-11A	VOCs
	4/01/2011	IR49-MW04	IR49-GW04-11A	VOCs
	4/01/2011	IR49-MW05	IR49-GW05-11A	VOCs
	4/01/2011	IR49-MW06	IR49-GW06-11A	VOCs
	4/02/2011	IR49-MW07	IR49-GW07-11A[2]	VOCs
	4/02/2011	IR49-MW07	IR49-GW07D-11A[1, 2]	VOCs
	4/02/2011	IR49-MW08	IR49-GW08-11A[2]	VOCs
	7/12/2009	IR49-TW01	IR49-TW01-09C[2]	VOCs, SVOCs, Metals
	7/12/2009	IR49-TW01	IR49-TW01D-09C[1, 2]	VOCs, SVOCs, Metals
	2/18/2010	IR49-TW01R	IR49-TW01R-10A[2]	VOCs
	2/19/2010	IR49-TW04	IR49-TW04-10A	VOCs
	2/18/2010	IR49-TW05	IR49-TW05-10A[2]	VOCs
	2/18/2010	IR49-TW06	IR49-TW06-10A[2]	VOCs
	2/18/2010	IR49-TW07	IR49-TW07-10A[2]	VOCs
	2/18/2010	IR49-TW08	IR49-TW08-10A	VOCs

Notes:
[1] Duplicate sample of sample listed above
[2] Sample included in groundwater plume used to calculate exposure point concentration
VOCs = Volatile organic constituents
SVOCs = Semi-volatile organic constituents

StationID	IR49-SS02	IR49-SS03	IR49-SS04	IR49-SS05	IR49-SS06	IR49-SS07	IR49-SS08	IR49-SS09	IR49-SS09	IR49-SS10	IR49-SS11	IR49-SS12	IR49-SS12	IR49-SS13
SampleID	IR49-SS02-11A	IR49-SS03-11A	IR49-SS04-11A	IR49-SS05-11A	IR49-SS06-11A	IR49-SS07-11A	IR49-SS08-11B	IR49-SS09-11A	IR49-SS09D-11A	IR49-SS10-11A	IR49-SS11-11A	IR49-SS12-11A	IR49-SS12D-11B	IR49-SS13-11B
SampleDate	3/29/2011	3/29/2011	3/29/2011	3/29/2011	3/29/2011	3/29/2011	4/18/2011	3/28/2011	3/28/2011	3/28/2011	3/28/2011	3/28/2011	4/18/2011	4/18/2011
AnalyteName														
VOA(UG/KG)														
1,1,1-Trichloroethane	63 U	32 U	29 U	0.5 U	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
1,1,2,2-Tetrachloroethane	130 U	64 U	57 U	0.5 UJ	110 U	**0.86 J**	82 U	79 U	82 U	63 U	150 U	410 U	230 U	0.77 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	63 U	32 U	29 U	0.5 U	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
1,1,2-Trichloroethane	63 U	32 U	29 U	0.5 U	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
1,1-Dichloroethane	31 U	16 U	14 U	0.25 U	27 U	0.25 UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.39 U
1,1-Dichloroethene	63 U	32 U	29 U	0.5 U	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
1,2,4-Trichlorobenzene	63 U	32 U	29 U	0.5 UJ	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
1,2-Dibromo-3-chloropropane	63 U	32 U	29 U	0.5 UJ	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
1,2-Dibromoethane	63 U	32 U	29 U	0.5 U	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
1,2-Dichlorobenzene	31 U	16 U	14 U	0.5 UJ	27 U	0.49 UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.77 U
1,2-Dichloroethane	31 U	16 U	14 U	0.5 U	27 U	0.49 UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.77 U
1,2-Dichloropropane	63 U	32 U	29 U	0.5 U	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
1,3-Dichlorobenzene	31 U	16 U	14 U	0.25 UJ	27 U	0.25 UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.39 U
1,4-Dichlorobenzene	63 U	32 U	29 U	0.25 UJ	53 U	0.25 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
2-Butanone	130 U	64 U	57 U	**7.3 J**	110 U	**15 J**	82 U	79 U	82 U	63 U	150 U	410 U	230 U	0.77 R
2-Hexanone	63 U	32 U	29 U	0.5 U	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
4-Methyl-2-pentanone	63 U	32 U	29 U	0.5 U	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
Acetone	250 U	130 U	110 U	**190 J**	210 U	**220 J**	160 U	230 U	170 U	170 U	300 U	810 U	470 U	**42 J**
Benzene	63 U	32 U	29 U	0.5 U	53 U	**1.9 J**	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
Bromodichloromethane	31 U	16 U	14 U	0.5 U	27 U	0.49 UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.77 U
Bromoform	63 U	32 U	29 U	0.25 U	53 U	0.25 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
Bromomethane	130 U	64 U	57 U	0.5 U	110 U	0.49 UJ	82 U	79 U	82 U	63 U	150 U	410 U	230 U	0.77 U
Carbon disulfide	**15 J**	16 U	14 U	**0.68 J**	27 U	**12 J**	20 U	**11 J**	**9 J**	**9.5 J**	37 U	**45 J**	58 U	**1.6**
Carbon tetrachloride	31 U	16 U	14 U	0.25 U	27 U	0.25 UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.39 U
Chlorobenzene	63 U	32 U	29 U	0.25 U	53 U	0.25 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
Chloroethane	63 U	32 U	29 U	0.5 U	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
Chloroform	63 U	32 U	29 U	0.25 U	53 U	0.25 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
Chloromethane	63 U	32 U	29 U	0.5 U	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
cis-1,2-Dichloroethene	63 U	32 U	29 U	0.25 U	53 U	0.25 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
cis-1,3-Dichloropropene	63 U	32 U	29 U	0.25 U	53 U	0.25 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
Cyclohexane	63 U	32 U	29 U	0.5 U	53 U	**0.98 J**	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
Dibromochloromethane	63 U	32 U	29 U	0.5 U	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
Dichlorodifluoromethane (Freon-12)	63 U	32 U	29 U	0.5 U	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
Ethylbenzene	63 U	32 U	29 U	0.5 U	53 U	**2.7 J**	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
Isopropylbenzene	63 U	32 U	29 U	0.25 UJ	53 U	0.25 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
Methyl acetate	**470 J**	**290 J**	**210 J**	**2.1 J**	330 U	0.49 UJ	**140 J**	**1300**	**1200**	**110 J**	**720 J**	**5000 J**	**420 J**	0.77 U
Methylcyclohexane	31 U	16 U	14 U	0.5 U	27 U	**1.1 J**	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.77 U
Methylene chloride	34 U	19 U	15 U	1.5 U	29 U	3.3 U	**27 J**	30 U	24 U	24 U	46 U	120 U	**91 J**	0.77 U
Methyl-tert-butyl ether (MTBE)	63 U	32 U	29 U	0.5 U	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
Styrene	63 U	32 U	29 U	0.25 U	53 U	0.25 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
Tetrachloroethene	31 U	16 U	14 U	0.5 U	27 U	0.49 UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.77 U
Toluene	63 U	32 U	29 U	**0.98 J**	53 U	**3 J**	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
trans-1,2-Dichloroethene	31 U	16 U	14 U	0.25 U	27 U	0.25 UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.39 U
trans-1,3-Dichloropropene	31 U	16 U	14 U	0.5 U	27 U	0.49 UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.77 U
Trichloroethene	63 U	32 U	29 U	**1.3 J**	53 U	**4.7 J**	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
Trichlorofluoromethane (Freon-11)	63 U	**39 J**	29 U	0.25 U	53 U	0.25 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
Vinyl chloride	63 U	32 U	29 U	0.25 U	53 U	0.25 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
Xylene, total	130 U	64 U	57 U	0.76 U	110 U	0.74 UJ	82 U	79 U	82 U	63 U	150 U	410 U	230 U	1.2 U
WCHEM()														
Total organic carbon (TOC) (MG/KG)	**18000**	**17000**	**4900**	**9600**	**19000**	**14000**	NS	**34000**	NS	**15000**	**97000**	**180000**	NS	NS

StationID	IR49-SS02	IR49-SS03	IR49-SS04	IR49-SS05	IR49-SS06	IR49-SS07	IR49-SS08	IR49-SS09	IR49-SS09	IR49-SS10	IR49-SS11	IR49-SS12	IR49-SS12	IR49-SS13
SampleID	IR49-SS02-11A	IR49-SS03-11A	IR49-SS04-11A	IR49-SS05-11A	IR49-SS06-11A	IR49-SS07-11A	IR49-SS08-11B	IR49-SS09-11A	IR49-SS09D-11A	IR49-SS10-11A	IR49-SS11-11A	IR49-SS12-11A	IR49-SS12D-11B	IR49-SS13-11B
SampleDate	3/29/2011	3/29/2011	3/29/2011	3/29/2011	3/29/2011	3/29/2011	4/18/2011	3/28/2011	3/28/2011	3/28/2011	3/28/2011	3/28/2011	4/18/2011	4/18/2011
AnalyteName														
VOA(UG/KG)														
1,1,1-Trichloroethane	63 U	32 U	29 U	0.5 U	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
1,1,2,2-Tetrachloroethane	130 U	64 U	57 U	0.5 UJ	110 U	**0.86 J**	82 U	79 U	82 U	63 U	150 U	410 U	230 U	0.77 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	63 U	32 U	29 U	0.5 U	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
1,1,2-Trichloroethane	63 U	32 U	29 U	0.5 U	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
1,1-Dichloroethane	31 U	16 U	14 U	0.25 U	27 U	0.25 UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.39 U
1,1-Dichloroethene	63 U	32 U	29 U	0.5 U	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
1,2,4-Trichlorobenzene	63 U	32 U	29 U	0.5 UJ	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
1,2-Dibromo-3-chloropropane	63 U	32 U	29 U	0.5 UJ	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
1,2-Dibromoethane	63 U	32 U	29 U	0.5 U	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
1,2-Dichlorobenzene	31 U	16 U	14 U	0.5 UJ	27 U	0.49 UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.77 U
1,2-Dichloroethane	31 U	16 U	14 U	0.5 U	27 U	0.49 UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.77 U
1,2-Dichloropropane	63 U	32 U	29 U	0.5 U	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
1,3-Dichlorobenzene	31 U	16 U	14 U	0.25 UJ	27 U	0.25 UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.39 U
1,4-Dichlorobenzene	63 U	32 U	29 U	0.25 UJ	53 U	0.25 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
2-Butanone	130 U	64 U	57 U	**7.3 J**	110 U	**15 J**	82 U	79 U	82 U	63 U	150 U	410 U	230 U	0.77 R
2-Hexanone	63 U	32 U	29 U	0.5 U	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
4-Methyl-2-pentanone	63 U	32 U	29 U	0.5 U	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
Acetone	250 U	130 U	110 U	**190 J**	210 U	**220 J**	160 U	230 U	170 U	170 U	300 U	810 U	470 U	**42 J**
Benzene	63 U	32 U	29 U	0.5 U	53 U	**1.9 J**	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
Bromodichloromethane	31 U	16 U	14 U	0.5 U	27 U	0.49 UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.77 U
Bromoform	63 U	32 U	29 U	0.25 U	53 U	0.25 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
Bromomethane	130 U	64 U	57 U	0.5 U	110 U	0.49 UJ	82 U	79 U	82 U	63 U	150 U	410 U	230 U	0.77 U
Carbon disulfide	**15 J**	16 U	14 U	**0.68 J**	27 U	**12 J**	20 U	**11 J**	**9 J**	**9.5 J**	37 U	**45 J**	58 U	**1.6**
Carbon tetrachloride	31 U	16 U	14 U	0.25 U	27 U	0.25 UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.39 U
Chlorobenzene	63 U	32 U	29 U	0.25 U	53 U	0.25 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
Chloroethane	63 U	32 U	29 U	0.5 U	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
Chloroform	63 U	32 U	29 U	0.25 U	53 U	0.25 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
Chloromethane	63 U	32 U	29 U	0.5 U	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
cis-1,2-Dichloroethene	63 U	32 U	29 U	0.25 U	53 U	0.25 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
cis-1,3-Dichloropropene	63 U	32 U	29 U	0.25 U	53 U	0.25 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
Cyclohexane	63 U	32 U	29 U	0.5 U	53 U	**0.98 J**	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
Dibromochloromethane	63 U	32 U	29 U	0.5 U	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
Dichlorodifluoromethane (Freon-12)	63 U	32 U	29 U	0.5 U	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
Ethylbenzene	63 U	32 U	29 U	0.5 U	53 U	**2.7 J**	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
Isopropylbenzene	63 U	32 U	29 U	0.25 UJ	53 U	0.25 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
Methyl acetate	**470 J**	**290 J**	**210 J**	**2.1 J**	330 U	0.49 UJ	**140 J**	**1300**	**1200**	**110 J**	**720 J**	**5000 J**	**420 J**	0.77 U
Methylcyclohexane	31 U	16 U	14 U	0.5 U	27 U	**1.1 J**	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.77 U
Methylene chloride	34 U	19 U	15 U	1.5 U	29 U	3.3 U	**27 J**	30 U	24 U	24 U	46 U	120 U	**91 J**	0.77 U
Methyl-tert-butyl ether (MTBE)	63 U	32 U	29 U	0.5 U	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
Styrene	63 U	32 U	29 U	0.25 U	53 U	0.25 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
Tetrachloroethene	31 U	16 U	14 U	0.5 U	27 U	0.49 UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.77 U
Toluene	63 U	32 U	29 U	**0.98 J**	53 U	**3 J**	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
trans-1,2-Dichloroethene	31 U	16 U	14 U	0.25 U	27 U	0.25 UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.39 U
trans-1,3-Dichloropropene	31 U	16 U	14 U	0.5 U	27 U	0.49 UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.77 U
Trichloroethene	63 U	32 U	29 U	**1.3 J**	53 U	**4.7 J**	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
Trichlorofluoromethane (Freon-11)	63 U	**39 J**	29 U	0.25 U	53 U	0.25 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
Vinyl chloride	63 U	32 U	29 U	0.25 U	53 U	0.25 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
Xylene, total	130 U	64 U	57 U	0.76 U	110 U	0.74 UJ	82 U	79 U	82 U	63 U	150 U	410 U	230 U	1.2 U
WCHEM()														
Total organic carbon (TOC) (MG/KG)	**18000**	**17000**	**4900**	**9600**	**19000**	**14000**	NS	**34000**	NS	**15000**	**97000**	**180000**	NS	NS

StationID	IR49-SD02/SW02	IR49-SD02/SW02	IR49-SD03/SW03
SampleID	IR49-SW02-11A	IR49-SW02D-11A	IR49-SW03-11A
SampleDate	3/29/2011	3/29/2011	3/29/2011
AnalyteName			
VOA(UG/L)			
1,1,1-Trichloroethane	0.5 U	0.5 U	0.5 U
1,1,2,2-Tetrachloroethane	0.5 U	0.5 U	0.5 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	0.5 U	0.5 U	0.5 U
1,1,2-Trichloroethane	0.5 U	0.5 U	0.5 U
1,1-Dichloroethane	0.5 U	0.5 U	0.5 U
1,1-Dichloroethene	0.5 U	0.5 U	0.5 U
1,2,4-Trichlorobenzene	0.5 U	0.5 U	0.5 U
1,2-Dibromo-3-chloropropane	0.5 U	0.5 U	0.5 U
1,2-Dibromoethane	0.25 U	0.25 U	0.25 U
1,2-Dichlorobenzene	0.5 U	0.5 U	0.5 U
1,2-Dichloroethane	0.5 U	0.5 U	0.5 U
1,2-Dichloropropane	0.5 U	0.5 U	0.5 U
1,3-Dichlorobenzene	0.25 U	0.25 U	0.25 U
1,4-Dichlorobenzene	0.5 U	0.5 U	0.5 U
2-Butanone	0.5 U	0.5 U	0.5 U
2-Hexanone	0.5 U	0.5 U	0.5 U
4-Methyl-2-pentanone	0.5 U	0.5 U	0.5 U
Acetone	4.3 U	6.9 U	6.3 U
Benzene	0.5 U	0.5 U	0.5 U
Bromodichloromethane	0.5 U	0.5 U	0.5 U
Bromoform	0.25 U	0.25 U	0.25 U
Bromomethane	0.5 U	0.5 U	0.5 U
Carbon disulfide	0.5 U	0.5 U	0.5 U
Carbon tetrachloride	0.5 U	0.5 U	0.5 U
Chlorobenzene	0.5 U	0.5 U	0.5 U
Chloroethane	0.5 U	0.5 U	0.5 U
Chloroform	0.5 U	0.5 U	0.5 U
Chloromethane	0.5 U	0.5 U	0.5 U
cis-1,2-Dichloroethene	0.5 U	0.5 U	0.5 U
cis-1,3-Dichloropropene	0.1 U	0.1 U	0.1 U
Cyclohexane	0.5 U	0.5 U	0.5 U
Dibromochloromethane	0.25 U	0.25 U	0.25 U
Dichlorodifluoromethane (Freon-12)	0.5 U	0.5 U	0.5 U
Ethylbenzene	0.25 U	0.25 U	0.25 U
Isopropylbenzene	0.5 U	0.5 U	0.5 U
Methyl acetate	0.5 U	0.5 U	0.5 U
Methylcyclohexane	0.5 U	0.5 U	0.5 U
Methylene chloride	0.5 U	0.5 U	0.5 U
Methyl-tert-butyl ether (MTBE)	0.5 U	0.5 U	0.5 U
Styrene	0.1 U	0.1 U	0.1 U
Tetrachloroethene	0.5 U	0.5 U	0.5 U
Toluene	0.1 U	0.1 U	0.1 U
trans-1,2-Dichloroethene	0.5 U	0.5 U	0.5 U
trans-1,3-Dichloropropene	0.25 U	0.25 U	0.25 U
Trichloroethene	0.5 U	0.5 U	0.5 U
Trichlorofluoromethane (Freon-11)	0.5 U	0.5 U	0.5 U
Vinyl chloride	0.5 U	0.5 U	0.5 U
Xylene, total	0.75 U	0.75 U	0.75 U
WCHEM()			
Total organic carbon (TOC) (UG/L)	**13000**	NS	**3900**

StationID	IR49-SD02/SW02	IR49-SD02/SW02	IR49-SD03/SW03
SampleID	IR49-SW02-11A	IR49-SW02D-11A	IR49-SW03-11A
SampleDate	3/29/2011	3/29/2011	3/29/2011
AnalyteName			
VOA(UG/L)			
1,1,1-Trichloroethane	0.5 U	0.5 U	0.5 U
1,1,2,2-Tetrachloroethane	0.5 U	0.5 U	0.5 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	0.5 U	0.5 U	0.5 U
1,1,2-Trichloroethane	0.5 U	0.5 U	0.5 U
1,1-Dichloroethane	0.5 U	0.5 U	0.5 U
1,1-Dichloroethene	0.5 U	0.5 U	0.5 U
1,2,4-Trichlorobenzene	0.5 U	0.5 U	0.5 U
1,2-Dibromo-3-chloropropane	0.5 U	0.5 U	0.5 U
1,2-Dibromoethane	0.25 U	0.25 U	0.25 U
1,2-Dichlorobenzene	0.5 U	0.5 U	0.5 U
1,2-Dichloroethane	0.5 U	0.5 U	0.5 U
1,2-Dichloropropane	0.5 U	0.5 U	0.5 U
1,3-Dichlorobenzene	0.25 U	0.25 U	0.25 U
1,4-Dichlorobenzene	0.5 U	0.5 U	0.5 U
2-Butanone	0.5 U	0.5 U	0.5 U
2-Hexanone	0.5 U	0.5 U	0.5 U
4-Methyl-2-pentanone	0.5 U	0.5 U	0.5 U
Acetone	4.3 U	6.9 U	6.3 U
Benzene	0.5 U	0.5 U	0.5 U
Bromodichloromethane	0.5 U	0.5 U	0.5 U
Bromoform	0.25 U	0.25 U	0.25 U
Bromomethane	0.5 U	0.5 U	0.5 U
Carbon disulfide	0.5 U	0.5 U	0.5 U
Carbon tetrachloride	0.5 U	0.5 U	0.5 U
Chlorobenzene	0.5 U	0.5 U	0.5 U
Chloroethane	0.5 U	0.5 U	0.5 U
Chloroform	0.5 U	0.5 U	0.5 U
Chloromethane	0.5 U	0.5 U	0.5 U
cis-1,2-Dichloroethene	0.5 U	0.5 U	0.5 U
cis-1,3-Dichloropropene	0.1 U	0.1 U	0.1 U
Cyclohexane	0.5 U	0.5 U	0.5 U
Dibromochloromethane	0.25 U	0.25 U	0.25 U
Dichlorodifluoromethane (Freon-12)	0.5 U	0.5 U	0.5 U
Ethylbenzene	0.25 U	0.25 U	0.25 U
Isopropylbenzene	0.5 U	0.5 U	0.5 U
Methyl acetate	0.5 U	0.5 U	0.5 U
Methylcyclohexane	0.5 U	0.5 U	0.5 U
Methylene chloride	0.5 U	0.5 U	0.5 U
Methyl-tert-butyl ether (MTBE)	0.5 U	0.5 U	0.5 U
Styrene	0.1 U	0.1 U	0.1 U
Tetrachloroethene	0.5 U	0.5 U	0.5 U
Toluene	0.1 U	0.1 U	0.1 U
trans-1,2-Dichloroethene	0.5 U	0.5 U	0.5 U
trans-1,3-Dichloropropene	0.25 U	0.25 U	0.25 U
Trichloroethene	0.5 U	0.5 U	0.5 U
Trichlorofluoromethane (Freon-11)	0.5 U	0.5 U	0.5 U
Vinyl chloride	0.5 U	0.5 U	0.5 U
Xylene, total	0.75 U	0.75 U	0.75 U
WCHEM()			
Total organic carbon (TOC) (UG/L)	**13000**	NS	**3900**

StationID	IR49-SD04/PW01		IR49-SD05/PW02		IR49-SD05/PW02		IR49-SD06/PW03	
SampleID	IR49-PW01-11A		IR49-PW02-11A		IR49-PW02D-11A		IR49-PW03-11A	
SampleDate	4/2/2011		4/1/2011		4/1/2011		4/1/2011	
AnalyteName								
VOA(UG/L)								
1,1,1-Trichloroethane	0.5	U	0.5	U	0.5	U	0.5	U
1,1,2,2-Tetrachloroethane	**0.19**	**J**	0.5	U	0.5	U	0.5	U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	0.5	U	0.5	U	0.5	U	0.5	U
1,1,2-Trichloroethane	0.5	U	0.5	U	0.5	U	0.5	U
1,1-Dichloroethane	0.5	U	0.5	U	0.5	U	0.5	U
1,1-Dichloroethene	0.5	U	0.5	U	0.5	U	0.5	U
1,2,4-Trichlorobenzene	0.5	U	0.5	U	0.5	U	0.5	U
1,2-Dibromo-3-chloropropane	0.5	U	0.5	U	0.5	U	0.5	U
1,2-Dibromoethane	0.25	U	0.25	U	0.25	U	0.25	U
1,2-Dichlorobenzene	0.5	U	0.5	U	0.5	U	0.5	U
1,2-Dichloroethane	0.5	U	0.5	U	0.5	U	0.5	U
1,2-Dichloropropane	0.5	U	0.5	U	0.5	U	0.5	U
1,3-Dichlorobenzene	0.25	U	0.25	U	0.25	U	0.25	U
1,4-Dichlorobenzene	0.5	U	0.5	U	0.5	U	0.5	U
2-Butanone	**2.6**	**J**	**0.82**	**J**	**0.84**	**J**	0.5	U
2-Hexanone	0.5	U	0.5	U	0.5	U	0.5	U
4-Methyl-2-pentanone	0.5	U	0.5	U	0.5	U	0.5	U
Acetone	**100**		6.2	U	7.6	U	5.6	U
Benzene	0.5	U	0.5	U	0.5	U	0.5	U
Bromodichloromethane	0.5	U	0.5	U	0.5	U	0.5	U
Bromoform	0.25	U	0.25	U	0.25	U	0.25	U
Bromomethane	0.5	U	0.5	U	0.5	U	0.5	U
Carbon disulfide	**0.39**	**J**	0.5	U	0.5	U	**0.21**	**J**
Carbon tetrachloride	0.5	U	0.5	U	0.5	U	0.5	U
Chlorobenzene	0.5	U	0.5	U	0.5	U	0.5	U
Chloroethane	0.5	U	0.5	U	0.5	U	0.5	U
Chloroform	0.5	U	0.5	U	0.5	U	0.5	U
Chloromethane	0.5	U	0.5	U	0.5	U	0.5	U
cis-1,2-Dichloroethene	**2.5**		0.5	U	0.5	U	0.5	U
cis-1,3-Dichloropropene	0.1	U	0.1	U	0.1	U	0.1	U
Cyclohexane	0.5	U	0.5	U	0.5	U	0.5	U
Dibromochloromethane	0.25	U	0.25	U	0.25	U	0.25	U
Dichlorodifluoromethane (Freon-12)	0.5	U	0.5	U	0.5	U	0.5	U
Ethylbenzene	0.25	U	0.25	U	0.25	U	0.25	U
Isopropylbenzene	0.5	U	0.5	U	0.5	U	0.5	U
Methyl acetate	**0.97**	**J**	0.5	U	**0.75**	**J**	0.5	U
Methylcyclohexane	0.5	U	0.5	U	0.5	U	0.5	U
Methylene chloride	0.5	U	0.5	U	0.5	U	0.5	U
Methyl-tert-butyl ether (MTBE)	0.5	U	0.5	U	0.5	U	0.5	U
Styrene	0.1	U	0.1	U	0.1	U	0.1	U
Tetrachloroethene	0.5	U	0.5	U	0.5	U	0.5	U
Toluene	0.1	U	0.1	U	0.1	U	0.1	U
trans-1,2-Dichloroethene	**1.9**		0.5	U	0.5	U	0.5	U
trans-1,3-Dichloropropene	0.25	U	0.25	U	0.25	U	0.25	U
Trichloroethene	**1.1**		0.5	U	0.5	U	0.5	U
Trichlorofluoromethane (Freon-11)	0.5	U	0.5	U	0.5	U	0.5	U
Vinyl chloride	**0.3**	**J**	0.5	U	0.5	U	0.5	U
Xylene, total	0.75	U	0.75	U	0.75	U	0.75	U
WCHEM()								
Total organic carbon (TOC) (UG/L)	**3100**		**17000**		NS		**5700**	

StationID	IR49-SD04/PW01	IR49-SD05/PW02	IR49-SD05/PW02	IR49-SD06/PW03
SampleID	IR49-PW01-11A	IR49-PW02-11A	IR49-PW02D-11A	IR49-PW03-11A
SampleDate	4/2/2011	4/1/2011	4/1/2011	4/1/2011
AnalyteName				
VOA(UG/L)				
1,1,1-Trichloroethane	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2,2-Tetrachloroethane	**0.19 J**	0.5 U	0.5 U	0.5 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-Trichloroethane	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethane	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethene	0.5 U	0.5 U	0.5 U	0.5 U
1,2,4-Trichlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dibromo-3-chloropropane	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dibromoethane	0.25 U	0.25 U	0.25 U	0.25 U
1,2-Dichlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloroethane	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloropropane	0.5 U	0.5 U	0.5 U	0.5 U
1,3-Dichlorobenzene	0.25 U	0.25 U	0.25 U	0.25 U
1,4-Dichlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U
2-Butanone	**2.6 J**	**0.82 J**	**0.84 J**	0.5 U
2-Hexanone	0.5 U	0.5 U	0.5 U	0.5 U
4-Methyl-2-pentanone	0.5 U	0.5 U	0.5 U	0.5 U
Acetone	**100**	6.2 U	7.6 U	5.6 U
Benzene	0.5 U	0.5 U	0.5 U	0.5 U
Bromodichloromethane	0.5 U	0.5 U	0.5 U	0.5 U
Bromoform	0.25 U	0.25 U	0.25 U	0.25 U
Bromomethane	0.5 U	0.5 U	0.5 U	0.5 U
Carbon disulfide	**0.39 J**	0.5 U	0.5 U	**0.21 J**
Carbon tetrachloride	0.5 U	0.5 U	0.5 U	0.5 U
Chlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U
Chloroethane	0.5 U	0.5 U	0.5 U	0.5 U
Chloroform	0.5 U	0.5 U	0.5 U	0.5 U
Chloromethane	0.5 U	0.5 U	0.5 U	0.5 U
cis-1,2-Dichloroethene	**2.5**	0.5 U	0.5 U	0.5 U
cis-1,3-Dichloropropene	0.1 U	0.1 U	0.1 U	0.1 U
Cyclohexane	0.5 U	0.5 U	0.5 U	0.5 U
Dibromochloromethane	0.25 U	0.25 U	0.25 U	0.25 U
Dichlorodifluoromethane (Freon-12)	0.5 U	0.5 U	0.5 U	0.5 U
Ethylbenzene	0.25 U	0.25 U	0.25 U	0.25 U
Isopropylbenzene	0.5 U	0.5 U	0.5 U	0.5 U
Methyl acetate	**0.97 J**	0.5 U	**0.75 J**	0.5 U
Methylcyclohexane	0.5 U	0.5 U	0.5 U	0.5 U
Methylene chloride	0.5 U	0.5 U	0.5 U	0.5 U
Methyl-tert-butyl ether (MTBE)	0.5 U	0.5 U	0.5 U	0.5 U
Styrene	0.1 U	0.1 U	0.1 U	0.1 U
Tetrachloroethene	0.5 U	0.5 U	0.5 U	0.5 U
Toluene	0.1 U	0.1 U	0.1 U	0.1 U
trans-1,2-Dichloroethene	**1.9**	0.5 U	0.5 U	0.5 U
trans-1,3-Dichloropropene	0.25 U	0.25 U	0.25 U	0.25 U
Trichloroethene	**1.1**	0.5 U	0.5 U	0.5 U
Trichlorofluoromethane (Freon-11)	0.5 U	0.5 U	0.5 U	0.5 U
Vinyl chloride	**0.3 J**	0.5 U	0.5 U	0.5 U
Xylene, total	0.75 U	0.75 U	0.75 U	0.75 U
WCHEM()				
Total organic carbon (TOC) (UG/L)	**3100**	**17000**	NS	**5700**

StationID	IR49-SD02/SW02		IR49-SD02/SW02		IR49-SD03/SW03		IR49-SD04/PW01		IR49-SD05/PW02		IR49-SD06/PW03	
SampleID	IR49-SD02-11A		IR49-SD02D-11A		IR49-SD03-11A		IR49-SD04-11B		IR49-SD05-11A		IR49-SD06-11B	
SampleDate	3/29/2011		3/29/2011		3/29/2011		4/18/2011		3/30/2011		4/18/2011	
AnalyteName												
VOA(UG/KG)												
1,1,1-Trichloroethane	330	U	110	U	42	U	0.52	U	120	U	53	U
1,1,2,2-Tetrachloroethane	660	U	220	U	83	U	0.52	U	230	U	110	U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	330	U	110	U	42	U	0.52	U	120	U	53	U
1,1,2-Trichloroethane	330	U	110	U	42	U	0.52	U	120	U	53	U
1,1-Dichloroethane	170	U	55	U	21	U	0.26	U	58	U	27	U
1,1-Dichloroethene	330	U	110	U	42	U	0.52	U	120	U	53	U
1,2,4-Trichlorobenzene	330	U	110	U	42	U	0.52	U	120	U	53	U
1,2-Dibromo-3-chloropropane	330	U	110	U	42	U	0.52	U	120	U	53	U
1,2-Dibromoethane	330	U	110	U	42	U	0.52	U	120	U	53	U
1,2-Dichlorobenzene	170	U	55	U	21	U	0.52	U	58	U	27	U
1,2-Dichloroethane	170	U	55	U	21	U	0.52	U	58	U	27	U
1,2-Dichloropropane	330	U	110	U	42	U	0.52	U	120	U	53	U
1,3-Dichlorobenzene	170	U	55	U	21	U	0.26	U	58	U	27	U
1,4-Dichlorobenzene	330	U	110	U	42	U	0.26	U	120	U	53	U
2-Butanone	660	U	220	U	**57**	**J**	**3.4**	**J**	230	U	110	U
2-Hexanone	330	U	110	U	42	U	0.52	U	120	U	53	U
4-Methyl-2-pentanone	330	U	110	U	42	U	0.52	U	120	U	53	U
Acetone	1400	U	440	U	270	U	**28**	**J**	460	U	210	U
Benzene	330	U	110	U	42	U	**0.46**	**J**	120	U	53	U
Bromodichloromethane	170	U	55	U	21	U	0.52	U	58	U	27	U
Bromoform	330	U	110	U	42	U	0.26	U	120	U	53	U
Bromomethane	660	U	220	U	83	U	0.52	U	230	U	110	U
Carbon disulfide	**93**	**J**	**31**	**J**	**82**	**J**	**8.1**		**46**	**J**	27	U
Carbon tetrachloride	170	U	55	U	21	U	0.26	U	58	U	27	U
Chlorobenzene	330	U	110	U	42	U	0.26	U	120	U	53	U
Chloroethane	330	U	110	U	42	U	0.52	U	120	U	53	U
Chloroform	330	U	110	U	42	U	0.26	U	120	U	53	U
Chloromethane	330	U	110	U	42	U	0.52	U	120	U	53	U
cis-1,2-Dichloroethene	330	U	110	U	42	U	0.26	U	120	U	53	U
cis-1,3-Dichloropropene	330	U	110	U	42	U	0.26	U	120	U	53	U
Cyclohexane	330	U	110	U	42	U	0.52	U	120	U	53	U
Dibromochloromethane	330	U	110	U	42	U	0.52	U	120	U	53	U
Dichlorodifluoromethane (Freon-12)	330	U	110	U	42	U	**0.37**	**J**	120	U	53	U
Ethylbenzene	330	U	110	U	42	U	**0.31**	**J**	120	U	53	U
Isopropylbenzene	330	U	110	U	42	U	0.26	U	120	U	53	U
Methyl acetate	**1900**	**J**	**520**	**J**	**1300**		0.52	U	**700**	**J**	**140**	**J**
Methylcyclohexane	170	U	55	U	21	U	0.52	U	58	U	27	U
Methylene chloride	170	U	62	U	22	U	**0.54**	**J**	69	U	27	U
Methyl-tert-butyl ether (MTBE)	330	U	110	U	42	U	0.52	U	120	U	53	U
Styrene	330	U	110	U	42	U	0.26	U	120	U	53	U
Tetrachloroethene	170	U	55	U	21	U	0.52	U	58	U	27	U
Toluene	330	U	110	U	42	U	**0.6**	**J**	120	U	53	U
trans-1,2-Dichloroethene	170	U	55	U	21	U	0.26	U	58	U	27	U
trans-1,3-Dichloropropene	170	U	55	U	21	U	0.52	U	58	U	27	U
Trichloroethene	330	U	110	U	42	U	0.26	U	120	U	53	U
Trichlorofluoromethane (Freon-11)	330	U	110	U	42	U	0.26	U	120	U	53	U
Vinyl chloride	330	U	110	U	42	U	0.26	U	120	U	53	U
Xylene, total	660	U	220	U	83	U	0.78	U	230	U	110	U
WCHEM()												
Total organic carbon (TOC) (MG/KG)	**160000**		NS		**14000**		NS		**32000**		NS	

StationID	IR49-SD02/SW02	IR49-SD02/SW02	IR49-SD03/SW03	IR49-SD04/PW01	IR49-SD05/PW02	IR49-SD06/PW03
SampleID	IR49-SD02-11A	IR49-SD02D-11A	IR49-SD03-11A	IR49-SD04-11B	IR49-SD05-11A	IR49-SD06-11B
SampleDate	3/29/2011	3/29/2011	3/29/2011	4/18/2011	3/30/2011	4/18/2011
AnalyteName						
VOA(UG/KG)						
1,1,1-Trichloroethane	330 U	110 U	42 U	0.52 U	120 U	53 U
1,1,2,2-Tetrachloroethane	660 U	220 U	83 U	0.52 U	230 U	110 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	330 U	110 U	42 U	0.52 U	120 U	53 U
1,1,2-Trichloroethane	330 U	110 U	42 U	0.52 U	120 U	53 U
1,1-Dichloroethane	170 U	55 U	21 U	0.26 U	58 U	27 U
1,1-Dichloroethene	330 U	110 U	42 U	0.52 U	120 U	53 U
1,2,4-Trichlorobenzene	330 U	110 U	42 U	0.52 U	120 U	53 U
1,2-Dibromo-3-chloropropane	330 U	110 U	42 U	0.52 U	120 U	53 U
1,2-Dibromoethane	330 U	110 U	42 U	0.52 U	120 U	53 U
1,2-Dichlorobenzene	170 U	55 U	21 U	0.52 U	58 U	27 U
1,2-Dichloroethane	170 U	55 U	21 U	0.52 U	58 U	27 U
1,2-Dichloropropane	330 U	110 U	42 U	0.52 U	120 U	53 U
1,3-Dichlorobenzene	170 U	55 U	21 U	0.26 U	58 U	27 U
1,4-Dichlorobenzene	330 U	110 U	42 U	0.26 U	120 U	53 U
2-Butanone	660 U	220 U	**57 J**	**3.4 J**	230 U	110 U
2-Hexanone	330 U	110 U	42 U	0.52 U	120 U	53 U
4-Methyl-2-pentanone	330 U	110 U	42 U	0.52 U	120 U	53 U
Acetone	1400 U	440 U	270 U	**28 J**	460 U	210 U
Benzene	330 U	110 U	42 U	**0.46 J**	120 U	53 U
Bromodichloromethane	170 U	55 U	21 U	0.52 U	58 U	27 U
Bromoform	330 U	110 U	42 U	0.26 U	120 U	53 U
Bromomethane	660 U	220 U	83 U	0.52 U	230 U	110 U
Carbon disulfide	**93 J**	**31 J**	**82 J**	**8.1**	**46 J**	27 U
Carbon tetrachloride	170 U	55 U	21 U	0.26 U	58 U	27 U
Chlorobenzene	330 U	110 U	42 U	0.26 U	120 U	53 U
Chloroethane	330 U	110 U	42 U	0.52 U	120 U	53 U
Chloroform	330 U	110 U	42 U	0.26 U	120 U	53 U
Chloromethane	330 U	110 U	42 U	0.52 U	120 U	53 U
cis-1,2-Dichloroethene	330 U	110 U	42 U	0.26 U	120 U	53 U
cis-1,3-Dichloropropene	330 U	110 U	42 U	0.26 U	120 U	53 U
Cyclohexane	330 U	110 U	42 U	0.52 U	120 U	53 U
Dibromochloromethane	330 U	110 U	42 U	0.52 U	120 U	53 U
Dichlorodifluoromethane (Freon-12)	330 U	110 U	42 U	**0.37 J**	120 U	53 U
Ethylbenzene	330 U	110 U	42 U	**0.31 J**	120 U	53 U
Isopropylbenzene	330 U	110 U	42 U	0.26 U	120 U	53 U
Methyl acetate	**1900 J**	**520 J**	**1300**	0.52 U	**700 J**	**140 J**
Methylcyclohexane	170 U	55 U	21 U	0.52 U	58 U	27 U
Methylene chloride	170 U	62 U	22 U	**0.54 J**	69 U	27 U
Methyl-tert-butyl ether (MTBE)	330 U	110 U	42 U	0.52 U	120 U	53 U
Styrene	330 U	110 U	42 U	0.26 U	120 U	53 U
Tetrachloroethene	170 U	55 U	21 U	0.52 U	58 U	27 U
Toluene	330 U	110 U	42 U	**0.6 J**	120 U	53 U
trans-1,2-Dichloroethene	170 U	55 U	21 U	0.26 U	58 U	27 U
trans-1,3-Dichloropropene	170 U	55 U	21 U	0.52 U	58 U	27 U
Trichloroethene	330 U	110 U	42 U	0.26 U	120 U	53 U
Trichlorofluoromethane (Freon-11)	330 U	110 U	42 U	0.26 U	120 U	53 U
Vinyl chloride	330 U	110 U	42 U	0.26 U	120 U	53 U
Xylene, total	660 U	220 U	83 U	0.78 U	230 U	110 U
WCHEM()						
Total organic carbon (TOC) (MG/KG)	**160000**	NS	**14000**	NS	**32000**	NS

StationID	IR49-IS01	IR49-IS01	IR49-IS02	IR49-MW01	IR49-MW02	IR49-MW03	IR49-MW04	IR49-MW05	IR49-MW05	IR49-MW06	IR49-SS02	IR49-SS03	IR49-SS04	IR49-SS05
SampleID	IR49-IS01-7-8-09C	IR49-IS01D-7-8-09C	IR49-IS02-6-7-09C	IR49-SB09-3-4-11A	IR49-SB10-3-4-11A	IR49-SB11-2-3-11A	IR49-SB12-1_5-2-11A	IR49-SB13-1_5-2-11A	IR49-SB13D-1_5-2-11A	IR49-SB14-0_5-1-11A	IR49-SS02-11A	IR49-SS03-11A	IR49-SS04-11A	IR49-SS05-11A
SampleDate	7/8/2009	7/8/2009	7/9/2009	3/31/2011	3/31/2011	3/31/2011	3/31/2011	3/31/2011	4/1/2011	3/31/2011	3/29/2011	3/29/2011	3/29/2011	3/29/2011
AnalyteName														
VOA(UG/KG)														
1,1,1-Trichloroethane	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U	63 U	32 U	29 U	0.5
1,1,1-Trichloroethane	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U	63 U	32 U	29 U	0.5
1,1,2,2-Tetrachloroethane	9.4 U	10 U	**2.4 J**	**2.1**	**1.1 J**	0.53 U	0.42 U	0.49 UJ	59 U	0.53 UJ	130 U	64 U	57 U	0.5
1,1,2,2-Tetrachloroethane	9.4 U	10 U	**2.4 J**	**2.1**	**1.1 J**	0.53 U	0.42 U	0.49 UJ	59 U	0.53 UJ	130 U	64 U	57 U	0.5
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U	63 U	32 U	29 U	0.5
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U	63 U	32 U	29 U	0.5
1,1,2-Trichloroethane	9.4 U	10 U	9.6 U	**1.9 J**	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U	63 U	32 U	29 U	0.5
1,1,2-Trichloroethane	9.4 U	10 U	9.6 U	**1.9 J**	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U	63 U	32 U	29 U	0.5
1,1-Dichloroethane	9.4 U	10 U	9.6 U	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	15 U	0.27 U	31 U	16 U	14 U	0.25
1,1-Dichloroethane	9.4 U	10 U	9.6 U	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	15 U	0.27 U	31 U	16 U	14 U	0.25
1,1-Dichloroethene	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U	63 U	32 U	29 U	0.5
1,1-Dichloroethene	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U	63 U	32 U	29 U	0.5
1,2,4-Trichlorobenzene	9.4 U	10 U	9.6 UJ	0.51 U	0.51 U	0.53 U	0.42 U	0.49 UJ	30 U	0.53 UJ	63 U	32 U	29 U	0.5
1,2,4-Trichlorobenzene	9.4 U	10 U	9.6 UJ	0.51 U	0.51 U	0.53 U	0.42 U	0.49 UJ	30 U	0.53 UJ	63 U	32 U	29 U	0.5
1,2-Dibromo-3-chloropropane	4.7 U	5.1 U	4.8 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 UJ	30 U	0.53 UJ	63 U	32 U	29 U	0.5
1,2-Dibromo-3-chloropropane	4.7 U	5.1 U	4.8 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 UJ	30 U	0.53 UJ	63 U	32 U	29 U	0.5
1,2-Dibromoethane	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U	63 U	32 U	29 U	0.5
1,2-Dibromoethane	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U	63 U	32 U	29 U	0.5
1,2-Dichlorobenzene	9.4 U	10 U	9.6 UJ	0.51 U	0.51 U	0.53 U	0.42 U	0.49 UJ	15 U	0.53 UJ	31 U	16 U	14 U	0.5
1,2-Dichlorobenzene	9.4 U	10 U	9.6 UJ	0.51 U	0.51 U	0.53 U	0.42 U	0.49 UJ	15 U	0.53 UJ	31 U	16 U	14 U	0.5
1,2-Dichloroethane	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	15 U	0.53 U	31 U	16 U	14 U	0.5
1,2-Dichloroethane	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	15 U	0.53 U	31 U	16 U	14 U	0.5
1,2-Dichloropropane	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U	63 U	32 U	29 U	0.5
1,2-Dichloropropane	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U	63 U	32 U	29 U	0.5
1,3-Dichlorobenzene	9.4 U	10 U	9.6 U	0.26 U	0.25 U	0.26 U	0.21 U	0.24 UJ	15 U	0.27 UJ	31 U	16 U	14 U	0.25
1,3-Dichlorobenzene	9.4 U	10 U	9.6 U	0.26 U	0.25 U	0.26 U	0.21 U	0.24 UJ	15 U	0.27 UJ	31 U	16 U	14 U	0.25
1,4-Dichlorobenzene	9.4 U	10 U	9.6 U	0.26 U	0.25 U	0.26 U	0.21 U	0.24 UJ	30 U	0.27 UJ	63 U	32 U	29 U	0.25
1,4-Dichlorobenzene	9.4 U	10 U	9.6 U	0.26 U	0.25 U	0.26 U	0.21 U	0.24 UJ	30 U	0.27 UJ	63 U	32 U	29 U	0.25
2-Butanone	9.4 U	10 U	9.6 U	0.51 R	0.51 R	**2.4 J**	0.42 R	**6.4 J**	**56 J**	**2.2 J**	130 U	64 U	57 U	**7.3**
2-Butanone	9.4 U	10 U	9.6 U	0.51 R	0.51 R	**2.4 J**	0.42 R	**6.4 J**	**56 J**	**2.2 J**	130 U	64 U	57 U	**7.3**
2-Hexanone	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U	63 U	32 U	29 U	0.5
2-Hexanone	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U	63 U	32 U	29 U	0.5
4-Methyl-2-pentanone	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U	63 U	32 U	29 U	0.5
4-Methyl-2-pentanone	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U	63 U	32 U	29 U	0.5
Acetone	11 U	10 U	18 U	11 R	12 R	**46 J**	12 R	**35**	120 U	**48 J**	250 U	130 U	110 U	**190**
Acetone	11 U	10 U	18 U	11 R	12 R	**46 J**	12 R	**35**	120 U	**48 J**	250 U	130 U	110 U	**190**
Benzene	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	**1.8**	30 U	0.53 U	63 U	32 U	29 U	0.5
Benzene	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	**1.8**	30 U	0.53 U	63 U	32 U	29 U	0.5
Bromodichloromethane	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	15 U	0.53 U	31 U	16 U	14 U	0.5
Bromodichloromethane	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	15 U	0.53 U	31 U	16 U	14 U	0.5
Bromoform	9.4 U	10 U	9.6 U	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	30 U	0.27 U	63 U	32 U	29 U	0.25
Bromoform	9.4 U	10 U	9.6 U	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	30 U	0.27 U	63 U	32 U	29 U	0.25
Bromomethane	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	59 U	0.53 U	130 U	64 U	57 U	0.5
Bromomethane	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	59 U	0.53 U	130 U	64 U	57 U	0.5
Carbon disulfide	9.4 U	10 U	9.6 U	**0.22 J**	**0.21 J**	**0.46 J**	**0.27 J**	**1.2**	**7.1 J**	**0.4 J**	**15 J**	16 U	14 U	**0.68**
Carbon disulfide	9.4 U	10 U	9.6 U	**0.22 J**	**0.21 J**	**0.46 J**	**0.27 J**	**1.2**	**7.1 J**	**0.4 J**	**15 J**	16 U	14 U	**0.68**
Carbon tetrachloride	9.4 U	10 U	9.6 U	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	15 U	0.27 U	31 U	16 U	14 U	0.25
Carbon tetrachloride	9.4 U	10 U	9.6 U	0.26 U	0.26 U	0.26 U	0.21 U	0.24 U	15 U	0.27 U	31 U	16 U	14 U	0.25
Chlorobenzene	9.4 U	10 U	9.6 U	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	30 U	0.27 U	63 U	32 U	29 U	0.25
Chlorobenzene	9.4 U	10 U	9.6 U	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	30 U	0.27 U	63 U	32 U	29 U	0.25
Chloroethane	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U	63 U	32 U	29 U	0.5
Chloroethane	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U	63 U	32 U	29 U	0.5
Chloroform	9.4 U	10 U	9.6 U	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	30 U	0.27 U	63 U	32 U	29 U	0.25
Chloroform	9.4 U	10 U	9.6 U	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	30 U	0.27 U	63 U	32 U	29 U	0.25
Chloromethane	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U	63 U	32 U	29 U	0.5
Chloromethane	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U	63 U	32 U	29 U	0.5
cis-1,2-Dichloroethene	9.4 U	10 U	**1.2 J**	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	30 U	0.27 U	63 U	32 U	29 U	0.25
cis-1,2-Dichloroethene	9.4 U	10 U	**1.2 J**	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	30 U	0.27 U	63 U	32 U	29 U	0.25
cis-1,3-Dichloropropene	9.4 U	10 U	9.6 U	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	30 U	0.27 U	63 U	32 U	29 U	0.25
cis-1,3-Dichloropropene	9.4 U	10 U	9.6 U	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	30 U	0.27 U	63 U	32 U	29 U	0.25
Cyclohexane	9.4 U	10 U	**0.75 J**	0.51 U	0.51 U	0.53 U	0.42 U	**0.63 J**	30 U	0.53 U	63 U	32 U	29 U	0.5
Cyclohexane	9.4 U	10 U	**0.75 J**	0.51 U	0.51 U	0.53 U	0.42 U	**0.63 J**	30 U	0.53 U	63 U	32 U	29 U	0.5
Dibromochloromethane	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U	63 U	32 U	29 U	0.5
Dibromochloromethane	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U	63 U	32 U	29 U	0.5
Dichlorodifluoromethane (Freon-12)	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U	63 U	32 U	29 U	0.5
Dichlorodifluoromethane (Freon-12)	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U	63 U	32 U	29 U	0.5
Ethylbenzene	**0.78 J**	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	**3.3**	30 U	0.53 U	63 U	32 U	29 U	0.5
Ethylbenzene	**0.78 J**	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	**3.3**	30 U	0.53 U	63 U	32 U	29 U	0.5
Isopropylbenzene	9.4 U	10 U	9.6 UJ	0.26 U	0.25 U	0.26 U	0.21 U	0.24 UJ	30 U	0.27 UJ	63 U	32 U	29 U	0.25
Isopropylbenzene	9.4 U	10 U	9.6 UJ	0.26 U	0.25 U	0.26 U	0.21 U	0.24 UJ	30 U	0.27 UJ	63 U	32 U	29 U	0.25
Methyl acetate	9.4 U	10 U	9.6 UJ	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	**120 J**	0.53 U	**470 J**	**290 J**	**210 J**	**2.1**
Methyl acetate	9.4 U	10 U	9.6 UJ	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	**120 J**	0.53 U	**470 J**	**290 J**	**210 J**	**2.1**
Methylcyclohexane	9.4 U	10 U	**0.69 J**	0.51 U	0.51 U	0.53 U	0.42 U	**1 J**	15 U	0.53 U	31 U	16 U	14 U	0.5
Methylcyclohexane	9.4 U	10 U	**0.69 J**	0.51 U	0.51 U	0.53 U	0.42 U	**1 J**	15 U	0.53 U	31 U	16 U	14 U	0.5

Methylene chloride	**10**	**4.4 J**	**5.3 J**	2 U	1.9 U	1.7 U	1.9 U	2.2 U	15 U	1.7 U	34 U	19 U	15 U	1.5
Methylene chloride	**10**	**4.4 J**	**5.3 J**	2 U	1.9 U	1.7 U	1.9 U	2.2 U	15 U	1.7 U	34 U	19 U	15 U	1.5
Methyl-tert-butyl ether (MTBE)	9.4 U	10 U	9.6 U	0.51 UJ	0.51 UJ	0.53 UJ	0.42 UJ	0.49 UJ	30 U	0.53 UJ	63 U	32 U	29 U	0.5
Methyl-tert-butyl ether (MTBE)	9.4 U	10 U	9.6 U	0.51 UJ	0.51 UJ	0.53 UJ	0.42 UJ	0.49 UJ	30 U	0.53 UJ	63 U	32 U	29 U	0.5
Styrene	9.4 U	10 U	9.6 UJ	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	30 U	0.27 U	63 U	32 U	29 U	0.25
Styrene	9.4 U	10 U	9.6 UJ	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	30 U	0.27 U	63 U	32 U	29 U	0.25
Tetrachloroethene	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	15 U	0.53 U	31 U	16 U	14 U	0.5
Tetrachloroethene	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	15 U	0.53 U	31 U	16 U	14 U	0.5
Toluene	**0.93 J**	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	**3.1**	30 U	**0.34 J**	63 U	32 U	29 U	**0.98**
Toluene	**0.93 J**	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	**3.1**	30 U	**0.34 J**	63 U	32 U	29 U	**0.98**
trans-1,2-Dichloroethene	9.4 U	10 U	9.6 U	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	15 U	0.27 U	31 U	16 U	14 U	0.25
trans-1,2-Dichloroethene	9.4 U	10 U	9.6 U	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	15 U	0.27 U	31 U	16 U	14 U	0.25
trans-1,3-Dichloropropene	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	15 U	0.53 U	31 U	16 U	14 U	0.5
trans-1,3-Dichloropropene	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	15 U	0.53 U	31 U	16 U	14 U	0.5
Trichloroethene	9.4 U	10 U	**1.5 J**	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	30 U	0.27 U	63 U	32 U	29 U	**1.3**
Trichloroethene	9.4 U	10 U	**1.5 J**	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	30 U	0.27 U	63 U	32 U	29 U	**1.3**
Trichlorofluoromethane (Freon-11)	9.4 U	10 U	9.6 U	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	30 U	0.27 U	63 U	**39 J**	29 U	0.25
Trichlorofluoromethane (Freon-11)	9.4 U	10 U	9.6 U	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	30 U	0.27 U	63 U	**39 J**	29 U	0.25
Vinyl chloride	9.4 U	10 U	9.6 U	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	30 U	0.27 U	63 U	32 U	29 U	0.25
Vinyl chloride	9.4 U	10 U	9.6 U	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	30 U	0.27 U	63 U	32 U	29 U	0.25
Xylene, total	**3.2 J**	10 U	9.6 U	0.77 U	0.76 U	0.79 U	0.62 U	0.73 U	59 U	0.8 U	130 U	64 U	57 U	0.76
Xylene, total	**3.2 J**	10 U	9.6 U	0.77 U	0.76 U	0.79 U	0.62 U	0.73 U	59 U	0.8 U	130 U	64 U	57 U	0.76
SVOA(UG/KG)														
1,1-Biphenyl	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2,2'-Oxybis(1-chloropropane)	250 UJ	260 UJ	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2,4,5-Trichlorophenol	490 U	520 U	510 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2,4,6-Trichlorophenol	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2,4-Dichlorophenol	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2,4-Dimethylphenol	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2,4-Dinitrophenol	490 U	520 U	510 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2,4-Dinitrotoluene	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2,6-Dinitrotoluene	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2-Chloronaphthalene	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2-Chlorophenol	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2-Methylnaphthalene	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2-Methylphenol	250 UJ	260 UJ	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2-Nitroaniline	490 U	520 U	510 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2-Nitrophenol	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
3,3'-Dichlorobenzidine	250 UJ	260 UJ	260 UJ	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
3-Nitroaniline	490 U	520 U	510 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
4,6-Dinitro-2-methylphenol	490 U	520 U	510 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
4-Bromophenyl-phenylether	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
4-Chloro-3-methylphenol	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
4-Chloroaniline	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
4-Chlorophenyl-phenylether	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
4-Methylphenol	250 U	260 U	260 UJ	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
4-Nitroaniline	490 U	520 U	510 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
4-Nitrophenol	490 U	520 U	510 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Acenaphthene	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Acenaphthylene	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Acetophenone	250 UJ	260 UJ	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Anthracene	250 U	260 U	260 UJ	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Atrazine	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Benzaldehyde	250 UJ	260 UJ	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Benzo(a)anthracene	62 U	64 U	64 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Benzo(a)pyrene	6.6 U	6.9 U	**1.5 J**	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Benzo(b)fluoranthene	62 U	64 U	**2.3 J**	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Benzo(g,h,i)perylene	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Benzo(k)fluoranthene	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
bis(2-Chloroethoxy)methane	250 UJ	260 UJ	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
bis(2-Chloroethyl)ether	250 UJ	260 UJ	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
bis(2-Ethylhexyl)phthalate	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Butylbenzylphthalate	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Caprolactam	**200 J**	**190 J**	**160 J**	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Carbazole	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Chrysene	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Dibenz(a,h)anthracene	15 U	16 U	16 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Dibenzofuran	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Diethylphthalate	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Dimethyl phthalate	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Di-n-butylphthalate	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Di-n-octylphthalate	410 U	430 U	430 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Fluoranthene	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Fluorene	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Hexachlorobenzene	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Hexachlorobutadiene	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Hexachlorocyclopentadiene	250 U	260 U	260 UJ	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Hexachloroethane	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Indeno(1,2,3-cd)pyrene	62 U	64 U	64 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Isophorone	62 U	64 U	64 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Naphthalene	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
n-Nitroso-di-n-propylamine	31 UJ	33 UJ	33 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
n-Nitrosodiphenylamine	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Nitrobenzene	250 U	260 U	260 UJ	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Pentachlorophenol	65 UJ	72 UJ	70 UJ	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Phenanthrene	250 U	260 U	260 UJ	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Phenol	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Pyrene	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
METAL(MG/KG)														
Aluminum	**14900**	**17000**	**15200**	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Antimony	0.9 R	0.94 R	0.95 R	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Arsenic	**2.1 J**	**1.5 J**	**6.8 J**	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Barium	**21.9**	**26.2**	**18.5**	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Beryllium	**0.167 J**	**0.192 J**	**0.18 J**	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Cadmium	0.299 U	0.315 U	0.315 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Calcium	**103 J**	**106 J**	**336**	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Chromium	**19.8 J**	**21.3 J**	**27.8 J**	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Cobalt	**0.63 J**	**0.79 J**	**0.43 J**	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Copper	**3**	**4.3**	**4.2**	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Iron	**6430 J**	**4020 J**	**18400 J**	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Lead	**14.5**	**16.4**	**13.5**	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Magnesium	**489 J**	**577 J**	**704 J**	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Manganese	**7**	**9.3**	**6.9**	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Mercury	0.041 U	**0.025 J**	0.043 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Nickel	**1.9**	**2.1 J**	**1.7**	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Potassium	**491 J**	**568 J**	**663 J**	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Selenium	**0.24 J**	**0.21 J**	**0.61**	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Silver	0.597 U	0.629 U	0.631 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Sodium	299 UJ	315 UJ	**277 J**	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Thallium	0.48 U	0.5 U	0.5 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Vanadium	**30.9 J**	**15.6 J**	**40.6 J**	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Zinc	**6.5**	**7.2**	**6.7**	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
WCHEM()														
Total organic carbon (TOC) (MG/KG)	NS	NS	NS	**5200**	**1600**	**1300**	**1500**	**1600**	NS	**8400**	**18000**	**17000**	**4900**	**9600**
Total organic carbon (TOC) (MG/KG)	NS	NS	NS	**5200**	**1600**	**1300**	**1500**	**1600**	NS	**8400**	**18000**	**17000**	**4900**	**9600**

StationID		IR49-SS06	IR49-SS07	IR49-SS08	IR49-SS09	IR49-SS09	IR49-SS10	IR49-SS11	IR49-SS12	IR49-SS12	IR49-SS13
SampleID		IR49-SS06-11A	IR49-SS07-11A	IR49-SS08-11B	IR49-SS09-11A	IR49-SS09D-11A	IR49-SS10-11A	IR49-SS11-11A	IR49-SS12-11A	IR49-SS12D-11B	IR49-SS13-11B
SampleDate		3/29/2011	3/29/2011	4/18/2011	3/28/2011	3/28/2011	3/28/2011	3/28/2011	3/28/2011	4/18/2011	4/18/2011
AnalyteName											
VOA(UG/KG)											
1,1,1-Trichloroethane	U	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
1,1,1-Trichloroethane	U	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
1,1,2,2-Tetrachloroethane	UJ	110 U	**0.86 J**	82 U	79 U	82 U	63 U	150 U	410 U	230 U	0.77 U
1,1,2,2-Tetrachloroethane	UJ	110 U	**0.86 J**	82 U	79 U	82 U	63 U	150 U	410 U	230 U	0.77 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	U	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	U	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
1,1,2-Trichloroethane	U	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
1,1,2-Trichloroethane	U	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
1,1-Dichloroethane	U	27 U	0.25 UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.39 U
1,1-Dichloroethane	U	27 U	0.25 UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.39 U
1,1-Dichloroethene	U	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
1,1-Dichloroethene	U	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
1,2,4-Trichlorobenzene	UJ	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
1,2,4-Trichlorobenzene	UJ	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
1,2-Dibromo-3-chloropropane	UJ	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
1,2-Dibromo-3-chloropropane	UJ	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
1,2-Dibromoethane	U	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
1,2-Dibromoethane	U	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
1,2-Dichlorobenzene	UJ	27 U	0.49 UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.77 U
1,2-Dichlorobenzene	UJ	27 U	0.49 UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.77 U
1,2-Dichloroethane	U	27 U	0.49 UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.77 U
1,2-Dichloroethane	U	27 U	0.49 UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.77 U
1,2-Dichloropropane	U	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
1,2-Dichloropropane	U	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
1,3-Dichlorobenzene	UJ	27 U	0.25 UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.39 U
1,3-Dichlorobenzene	UJ	27 U	0.25 UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.39 U
1,4-Dichlorobenzene	UJ	53 U	0.25 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
1,4-Dichlorobenzene	UJ	53 U	0.25 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
2-Butanone	**J**	110 U	**15 J**	82 U	79 U	82 U	63 U	150 U	410 U	230 U	0.77 R
2-Butanone	**J**	110 U	**15 J**	82 U	79 U	82 U	63 U	150 U	410 U	230 U	0.77 R
2-Hexanone	U	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
2-Hexanone	U	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
4-Methyl-2-pentanone	U	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
4-Methyl-2-pentanone	U	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
Acetone	**J**	210 U	**220 J**	160 U	230 U	170 U	170 U	300 U	810 U	470 U	**42 J**
Acetone	**J**	210 U	**220 J**	160 U	230 U	170 U	170 U	300 U	810 U	470 U	**42 J**
Benzene	U	53 U	**1.9 J**	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
Benzene	U	53 U	**1.9 J**	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
Bromodichloromethane	U	27 U	0.49 UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.77 U
Bromodichloromethane	U	27 U	0.49 UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.77 U
Bromoform	U	53 U	0.25 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
Bromoform	U	53 U	0.25 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
Bromomethane	U	110 U	0.49 UJ	82 U	79 U	82 U	63 U	150 U	410 U	230 U	0.77 U
Bromomethane	U	110 U	0.49 UJ	82 U	79 U	82 U	63 U	150 U	410 U	230 U	0.77 U
Carbon disulfide	**J**	27 U	**12 J**	20 U	**11 J**	**9 J**	**9.5 J**	37 U	**45 J**	58 U	**1.6**
Carbon disulfide	**J**	27 U	**12 J**	20 U	**11 J**	**9 J**	**9.5 J**	37 U	**45 J**	58 U	**1.6**
Carbon tetrachloride	U	27 U	0.25 UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.39 U
Carbon tetrachloride	U	27 U	0.25 UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.39 U
Chlorobenzene	U	53 U	0.25 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
Chlorobenzene	U	53 U	0.25 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
Chloroethane	U	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
Chloroethane	U	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
Chloroform	U	53 U	0.25 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
Chloroform	U	53 U	0.25 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
Chloromethane	U	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
Chloromethane	U	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
cis-1,2-Dichloroethene	U	53 U	0.25 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
cis-1,2-Dichloroethene	U	53 U	0.25 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
cis-1,3-Dichloropropene	U	53 U	0.25 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
cis-1,3-Dichloropropene	U	53 U	0.25 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
Cyclohexane	U	53 U	**0.98 J**	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
Cyclohexane	U	53 U	**0.98 J**	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
Dibromochloromethane	U	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
Dibromochloromethane	U	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
Dichlorodifluoromethane (Freon-12)	U	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
Dichlorodifluoromethane (Freon-12)	U	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
Ethylbenzene	U	53 U	**2.7 J**	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
Ethylbenzene	U	53 U	**2.7 J**	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
Isopropylbenzene	UJ	53 U	0.25 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
Isopropylbenzene	UJ	53 U	0.25 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
Methyl acetate	**J**	330 U	0.49 UJ	**140 J**	**1300**	**1200**	**110 J**	**720 J**	**5000**	**420 J**	0.77 U
Methyl acetate	**J**	330 U	0.49 UJ	**140 J**	**1300**	**1200**	**110 J**	**720 J**	**5000**	**420 J**	0.77 U
Methylcyclohexane	U	27 U	**1.1 J**	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.77 U
Methylcyclohexane	U	27 U	**1.1 J**	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.77 U

Methylene chloride	U	29 U	3.3 U	**27 J**	30 U	24 U	24 U	46 U	120 U	**91 J**	0.77 U
Methylene chloride	U	29 U	3.3 U	**27 J**	30 U	24 U	24 U	46 U	120 U	**91 J**	0.77 U
Methyl-tert-butyl ether (MTBE)	U	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
Methyl-tert-butyl ether (MTBE)	U	53 U	0.49 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
Styrene	U	53 U	0.25 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
Styrene	U	53 U	0.25 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
Tetrachloroethene	U	27 U	0.49 UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.77 U
Tetrachloroethene	U	27 U	0.49 UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.77 U
Toluene	**J**	53 U	**3 J**	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
Toluene	**J**	53 U	**3 J**	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
trans-1,2-Dichloroethene	U	27 U	0.25 UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.39 U
trans-1,2-Dichloroethene	U	27 U	0.25 UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.39 U
trans-1,3-Dichloropropene	U	27 U	0.49 UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.77 U
trans-1,3-Dichloropropene	U	27 U	0.49 UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.77 U
Trichloroethene	**J**	53 U	**4.7 J**	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
Trichloroethene	**J**	53 U	**4.7 J**	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
Trichlorofluoromethane (Freon-11)	U	53 U	0.25 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
Trichlorofluoromethane (Freon-11)	U	53 U	0.25 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
Vinyl chloride	U	53 U	0.25 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
Vinyl chloride	U	53 U	0.25 UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
Xylene, total	U	110 U	0.74 UJ	82 U	79 U	82 U	63 U	150 U	410 U	230 U	1.2 U
Xylene, total	U	110 U	0.74 UJ	82 U	79 U	82 U	63 U	150 U	410 U	230 U	1.2 U
SVOA(UG/KG)											
1,1-Biphenyl		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2,2'-Oxybis(1-chloropropane)		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2,4,5-Trichlorophenol		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2,4,6-Trichlorophenol		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2,4-Dichlorophenol		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2,4-Dimethylphenol		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2,4-Dinitrophenol		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2,4-Dinitrotoluene		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2,6-Dinitrotoluene		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2-Chloronaphthalene		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2-Chlorophenol		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2-Methylnaphthalene		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2-Methylphenol		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2-Nitroaniline		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2-Nitrophenol		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
3,3'-Dichlorobenzidine		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
3-Nitroaniline		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
4,6-Dinitro-2-methylphenol		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
4-Bromophenyl-phenylether		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
4-Chloro-3-methylphenol		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
4-Chloroaniline		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
4-Chlorophenyl-phenylether		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
4-Methylphenol		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
4-Nitroaniline		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
4-Nitrophenol		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Acenaphthene		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Acenaphthylene		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Acetophenone		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Anthracene		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Atrazine		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Benzaldehyde		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Benzo(a)anthracene		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Benzo(a)pyrene		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Benzo(b)fluoranthene		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Benzo(g,h,i)perylene		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Benzo(k)fluoranthene		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
bis(2-Chloroethoxy)methane		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
bis(2-Chloroethyl)ether		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
bis(2-Ethylhexyl)phthalate		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Butylbenzylphthalate		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Caprolactam		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Carbazole		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Chrysene		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Dibenz(a,h)anthracene		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Dibenzofuran		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Diethylphthalate		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Dimethyl phthalate		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Di-n-butylphthalate		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Di-n-octylphthalate		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Fluoranthene		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Fluorene		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Hexachlorobenzene		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Hexachlorobutadiene		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Hexachlorocyclopentadiene		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Hexachloroethane		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Indeno(1,2,3-cd)pyrene		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Isophorone	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Naphthalene	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
n-Nitroso-di-n-propylamine	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
n-Nitrosodiphenylamine	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Nitrobenzene	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Pentachlorophenol	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Phenanthrene	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Phenol	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Pyrene	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
METAL(MG/KG)										
Aluminum	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Antimony	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Arsenic	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Barium	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Beryllium	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Cadmium	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Calcium	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Chromium	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Cobalt	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Copper	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Iron	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Lead	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Magnesium	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Manganese	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Mercury	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Nickel	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Potassium	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Selenium	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Silver	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Sodium	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Thallium	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Vanadium	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Zinc	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
WCHEM()										
Total organic carbon (TOC) (MG/KG)	**19000**	**14000**	NS	**34000**	NS	**15000**	**97000**	**180000**	NS	NS
Total organic carbon (TOC) (MG/KG)	**19000**	**14000**	NS	**34000**	NS	**15000**	**97000**	**180000**	NS	NS

StationID	IR49-IS01	IR49-IS01	IR49-IS02	IR49-MW01	IR49-MW02	IR49-MW03	IR49-MW04	IR49-MW05	IR49-MW05	IR49-MW06	IR49-SS02	IR49-SS03	IR49-SS04	IR49-SS05	IR49-SS06	IR49-SS07
SampleID	IR49-IS01-7-8-09C	IR49-IS01D-7-8-09C	IR49-IS02-6-7-09C	IR49-SB09-3-4-11A	IR49-SB10-3-4-11A	IR49-SB11-2-3-11A	IR49-SB12-1_5-2-11A	IR49-SB13-1_5-2-11A	IR49-SB13D-1_5-2-11A	IR49-SB14-0_5-1-11A	IR49-SS02-11A	IR49-SS03-11A	IR49-SS04-11A	IR49-SS05-11A	IR49-SS06-11A	IR49-SS07-11A
SampleDate	7/8/2009	7/8/2009	7/9/2009	3/31/2011	3/31/2011	3/31/2011	3/31/2011	3/31/2011	4/1/2011	3/31/2011	3/29/2011	3/29/2011	3/29/2011	3/29/2011	3/29/2011	3/29/2011
AnalyteName																
VOA(UG/KG)																
1,1,1-Trichloroethane	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U	63 U	32 U	29 U	0.5 U	53 U	0.49
1,1,1-Trichloroethane	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U	63 U	32 U	29 U	0.5 U	53 U	0.49
1,1,2,2-Tetrachloroethane	9.4 U	10 U	**2.4 J**	**2.1**	**1.1 J**	0.53 U	0.42 U	0.49 UJ	59 U	0.53 UJ	130 U	64 U	57 U	0.5 UJ	110 U	**0.86**
1,1,2,2-Tetrachloroethane	9.4 U	10 U	**2.4 J**	**2.1**	**1.1 J**	0.53 U	0.42 U	0.49 UJ	59 U	0.53 UJ	130 U	64 U	57 U	0.5 UJ	110 U	**0.86**
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U	63 U	32 U	29 U	0.5 U	53 U	0.49
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U	63 U	32 U	29 U	0.5 U	53 U	0.49
1,1,2-Trichloroethane	9.4 U	10 U	9.6 U	**1.9 J**	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U	63 U	32 U	29 U	0.5 U	53 U	0.49
1,1,2-Trichloroethane	9.4 U	10 U	9.6 U	**1.9 J**	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U	63 U	32 U	29 U	0.5 U	53 U	0.49
1,1-Dichloroethane	9.4 U	10 U	9.6 U	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	15 U	0.27 U	31 U	16 U	14 U	0.25 U	27 U	0.25
1,1-Dichloroethane	9.4 U	10 U	9.6 U	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	15 U	0.27 U	31 U	16 U	14 U	0.25 U	27 U	0.25
1,1-Dichloroethene	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U	63 U	32 U	29 U	0.5 U	53 U	0.49
1,1-Dichloroethene	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U	63 U	32 U	29 U	0.5 U	53 U	0.49
1,2,4-Trichlorobenzene	9.4 U	10 U	9.6 UJ	0.51 U	0.51 U	0.53 U	0.42 U	0.49 UJ	30 U	0.53 UJ	63 U	32 U	29 U	0.5 UJ	53 U	0.49
1,2,4-Trichlorobenzene	9.4 U	10 U	9.6 UJ	0.51 U	0.51 U	0.53 U	0.42 U	0.49 UJ	30 U	0.53 UJ	63 U	32 U	29 U	0.5 UJ	53 U	0.49
1,2-Dibromo-3-chloropropane	4.7 U	5.1 U	4.8 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 UJ	30 U	0.53 UJ	63 U	32 U	29 U	0.5 UJ	53 U	0.49
1,2-Dibromo-3-chloropropane	4.7 U	5.1 U	4.8 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 UJ	30 U	0.53 UJ	63 U	32 U	29 U	0.5 UJ	53 U	0.49
1,2-Dibromoethane	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U	63 U	32 U	29 U	0.5 U	53 U	0.49
1,2-Dibromoethane	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U	63 U	32 U	29 U	0.5 U	53 U	0.49
1,2-Dichlorobenzene	9.4 U	10 U	9.6 UJ	0.51 U	0.51 U	0.53 U	0.42 U	0.49 UJ	15 U	0.53 UJ	31 U	16 U	14 U	0.5 UJ	27 U	0.49
1,2-Dichlorobenzene	9.4 U	10 U	9.6 UJ	0.51 U	0.51 U	0.53 U	0.42 U	0.49 UJ	15 U	0.53 UJ	31 U	16 U	14 U	0.5 UJ	27 U	0.49
1,2-Dichloroethane	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	15 U	0.53 U	31 U	16 U	14 U	0.5 U	27 U	0.49
1,2-Dichloroethane	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	15 U	0.53 U	31 U	16 U	14 U	0.5 U	27 U	0.49
1,2-Dichloropropane	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U	63 U	32 U	29 U	0.5 U	53 U	0.49
1,2-Dichloropropane	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U	63 U	32 U	29 U	0.5 U	53 U	0.49
1,3-Dichlorobenzene	9.4 U	10 U	9.6 U	0.26 U	0.25 U	0.26 U	0.21 U	0.24 UJ	15 U	0.27 UJ	31 U	16 U	14 U	0.25 UJ	27 U	0.25
1,3-Dichlorobenzene	9.4 U	10 U	9.6 U	0.26 U	0.25 U	0.26 U	0.21 U	0.24 UJ	15 U	0.27 UJ	31 U	16 U	14 U	0.25 UJ	27 U	0.25
1,4-Dichlorobenzene	9.4 U	10 U	9.6 U	0.26 U	0.25 U	0.26 U	0.21 U	0.24 UJ	30 U	0.27 UJ	63 U	32 U	29 U	0.25 UJ	53 U	0.25
1,4-Dichlorobenzene	9.4 U	10 U	9.6 U	0.26 U	0.25 U	0.26 U	0.21 U	0.24 UJ	30 U	0.27 UJ	63 U	32 U	29 U	0.25 UJ	53 U	0.25
2-Butanone	9.4 U	10 U	9.6 U	0.51 R	0.51 R	**2.4 J**	0.42 R	**6.4 J**	**56 J**	**2.2 J**	130 U	64 U	57 U	**7.3 J**	110 U	**15**
2-Butanone	9.4 U	10 U	9.6 U	0.51 R	0.51 R	**2.4 J**	0.42 R	**6.4 J**	**56 J**	**2.2 J**	130 U	64 U	57 U	**7.3 J**	110 U	**15**
2-Hexanone	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U	63 U	32 U	29 U	0.5 U	53 U	0.49
2-Hexanone	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U	63 U	32 U	29 U	0.5 U	53 U	0.49
4-Methyl-2-pentanone	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U	63 U	32 U	29 U	0.5 U	53 U	0.49
4-Methyl-2-pentanone	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U	63 U	32 U	29 U	0.5 U	53 U	0.49
Acetone	11 U	10 U	18 U	11 R	12 R	**46 J**	12 R	**35**	120 U	**48 J**	250 U	130 U	110 U	**190 J**	210 U	**220**
Acetone	11 U	10 U	18 U	11 R	12 R	**46 J**	12 R	**35**	120 U	**48 J**	250 U	130 U	110 U	**190 J**	210 U	**220**
Benzene	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	**1.8**	30 U	0.53 U	63 U	32 U	29 U	0.5 U	53 U	**1.9**
Benzene	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	**1.8**	30 U	0.53 U	63 U	32 U	29 U	0.5 U	53 U	**1.9**
Bromodichloromethane	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	15 U	0.53 U	31 U	16 U	14 U	0.5 U	27 U	0.49
Bromodichloromethane	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	15 U	0.53 U	31 U	16 U	14 U	0.5 U	27 U	0.49
Bromoform	9.4 U	10 U	9.6 U	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	30 U	0.27 U	63 U	32 U	29 U	0.25 U	53 U	0.25
Bromoform	9.4 U	10 U	9.6 U	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	30 U	0.27 U	63 U	32 U	29 U	0.25 U	53 U	0.25
Bromomethane	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	59 U	0.53 U	130 U	64 U	57 U	0.5 U	110 U	0.49
Bromomethane	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	59 U	0.53 U	130 U	64 U	57 U	0.5 U	110 U	0.49
Carbon disulfide	9.4 U	10 U	9.6 U	**0.22 J**	**0.21 J**	**0.46 J**	**0.27 J**	**1.2**	**7.1 J**	**0.4 J**	**15 J**	16 U	14 U	**0.68 J**	27 U	**12**
Carbon disulfide	9.4 U	10 U	9.6 U	**0.22 J**	**0.21 J**	**0.46 J**	**0.27 J**	**1.2**	**7.1 J**	**0.4 J**	**15 J**	16 U	14 U	**0.68 J**	27 U	**12**
Carbon tetrachloride	9.4 U	10 U	9.6 U	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	15 U	0.27 U	31 U	16 U	14 U	0.25 U	27 U	0.25
Carbon tetrachloride	9.4 U	10 U	9.6 U	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	15 U	0.27 U	31 U	16 U	14 U	0.25 U	27 U	0.25
Chlorobenzene	9.4 U	10 U	9.6 U	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	30 U	0.27 U	63 U	32 U	29 U	0.25 U	53 U	0.25
Chlorobenzene	9.4 U	10 U	9.6 U	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	30 U	0.27 U	63 U	32 U	29 U	0.25 U	53 U	0.25
Chloroethane	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U	63 U	32 U	29 U	0.5 U	53 U	0.49
Chloroethane	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U	63 U	32 U	29 U	0.5 U	53 U	0.49
Chloroform	9.4 U	10 U	9.6 U	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	30 U	0.27 U	63 U	32 U	29 U	0.25 U	53 U	0.25
Chloroform	9.4 U	10 U	9.6 U	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	30 U	0.27 U	63 U	32 U	29 U	0.25 U	53 U	0.25
Chloromethane	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U	63 U	32 U	29 U	0.5 U	53 U	0.49
Chloromethane	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U	63 U	32 U	29 U	0.5 U	53 U	0.49
cis-1,2-Dichloroethene	9.4 U	10 U	**1.2 J**	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	30 U	0.27 U	63 U	32 U	29 U	0.25 U	53 U	0.25
cis-1,2-Dichloroethene	9.4 U	10 U	**1.2 J**	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	30 U	0.27 U	63 U	32 U	29 U	0.25 U	53 U	0.25
cis-1,3-Dichloropropene	9.4 U	10 U	9.6 U	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	30 U	0.27 U	63 U	32 U	29 U	0.25 U	53 U	0.25
cis-1,3-Dichloropropene	9.4 U	10 U	9.6 U	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	30 U	0.27 U	63 U	32 U	29 U	0.25 U	53 U	0.25
Cyclohexane	9.4 U	10 U	**0.75 J**	0.51 U	0.51 U	0.53 U	0.42 U	**0.63 J**	30 U	0.53 U	63 U	32 U	29 U	0.5 U	53 U	**0.98**
Cyclohexane	9.4 U	10 U	**0.75 J**	0.51 U	0.51 U	0.53 U	0.42 U	**0.63 J**	30 U	0.53 U	63 U	32 U	29 U	0.5 U	53 U	**0.98**
Dibromochloromethane	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U	63 U	32 U	29 U	0.5 U	53 U	0.49
Dibromochloromethane	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U	63 U	32 U	29 U	0.5 U	53 U	0.49
Dichlorodifluoromethane (Freon-12)	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U	63 U	32 U	29 U	0.5 U	53 U	0.49
Dichlorodifluoromethane (Freon-12)	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	30 U	0.53 U	63 U	32 U	29 U	0.5 U	53 U	0.49
Ethylbenzene	**0.78 J**	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	**3.3**	30 U	0.53 U	63 U	32 U	29 U	0.5 U	53 U	**2.7**
Ethylbenzene	**0.78 J**	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	**3.3**	30 U	0.53 U	63 U	32 U	29 U	0.5 U	53 U	**2.7**
Isopropylbenzene	9.4 U	10 U	9.6 UJ	0.26 U	0.25 U	0.26 U	0.21 U	0.24 UJ	30 U	0.27 UJ	63 U	32 U	29 U	0.25 UJ	53 U	0.25
Isopropylbenzene	9.4 U	10 U	9.6 UJ	0.26 U	0.25 U	0.26 U	0.21 U	0.24 UJ	30 U	0.27 UJ	63 U	32 U	29 U	0.25 UJ	53 U	0.25
Methyl acetate	9.4 U	10 U	9.6 UJ	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	**120 J**	0.53 U	**470 J**	**290 J**	**210 J**	**2.1 J**	330 U	0.49
Methyl acetate	9.4 U	10 U	9.6 UJ	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	**120 J**	0.53 U	**470 J**	**290 J**	**210 J**	**2.1 J**	330 U	0.49
Methylcyclohexane	9.4 U	10 U	**0.69 J**	0.51 U	0.51 U	0.53 U	0.42 U	**1 J**	15 U	0.53 U	31 U	16 U	14 U	0.5 U	27 U	**1.1**
Methylcyclohexane	9.4 U	10 U	**0.69 J**	0.51 U	0.51 U	0.53 U	0.42 U	**1 J**	15 U	0.53 U	31 U	16 U	14 U	0.5 U	27 U	**1.1**
Methylene chloride	**10**	**4.4 J**	**5.3 J**	2 U	1.9 U	1.7 U	1.9 U	2.2 U	15 U	1.7 U	34 U	19 U	15 U	1.5 U	29 U	3.3
Methylene chloride	**10**	**4.4 J**	**5.3 J**	2 U	1.9 U	1.7 U	1.9 U	2.2 U	15 U	1.7 U	34 U	19 U	15 U	1.5 U	29 U	3.3
Methyl-tert-butyl ether (MTBE)	9.4 U	10 U	9.6 U	0.51 UJ	0.51 UJ	0.53 UJ	0.42 UJ	0.49 UJ	30 U	0.53 UJ	63 U	32 U	29 U	0.5 U	53 U	0.49
Methyl-tert-butyl ether (MTBE)	9.4 U	10 U	9.6 U	0.51 UJ	0.51 UJ	0.53 UJ	0.42 UJ	0.49 UJ	30 U	0.53 UJ	63 U	32 U	29 U	0.5 U	53 U	0.49

Styrene	9.4 U	10 U	9.6 UJ	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	30 U	0.27 U	63 U	32 U	29 U	0.25 U	53 U	0.25
Styrene	9.4 U	10 U	9.6 UJ	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	30 U	0.27 U	63 U	32 U	29 U	0.25 U	53 U	0.25
Tetrachloroethene	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	15 U	0.53 U	31 U	16 U	14 U	0.5 U	27 U	0.49
Tetrachloroethene	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	15 U	0.53 U	31 U	16 U	14 U	0.5 U	27 U	0.49
Toluene	**0.93 J**	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	**3.1**	30 U	**0.34 J**	63 U	32 U	29 U	**0.98 J**	53 U	**3**
Toluene	**0.93 J**	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	**3.1**	30 U	**0.34 J**	63 U	32 U	29 U	**0.98 J**	53 U	**3**
trans-1,2-Dichloroethene	9.4 U	10 U	9.6 U	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	15 U	0.27 U	31 U	16 U	14 U	0.25 U	27 U	0.25
trans-1,2-Dichloroethene	9.4 U	10 U	9.6 U	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	15 U	0.27 U	31 U	16 U	14 U	0.25 U	27 U	0.25
trans-1,3-Dichloropropene	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	15 U	0.53 U	31 U	16 U	14 U	0.5 U	27 U	0.49
trans-1,3-Dichloropropene	9.4 U	10 U	9.6 U	0.51 U	0.51 U	0.53 U	0.42 U	0.49 U	15 U	0.53 U	31 U	16 U	14 U	0.5 U	27 U	0.49
Trichloroethene	9.4 U	10 U	**1.5 J**	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	30 U	0.27 U	63 U	32 U	29 U	**1.3 J**	53 U	**4.7**
Trichloroethene	9.4 U	10 U	**1.5 J**	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	30 U	0.27 U	63 U	32 U	29 U	**1.3 J**	53 U	**4.7**
Trichlorofluoromethane (Freon-11)	9.4 U	10 U	9.6 U	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	30 U	0.27 U	63 U	**39 J**	29 U	0.25 U	53 U	0.25
Trichlorofluoromethane (Freon-11)	9.4 U	10 U	9.6 U	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	30 U	0.27 U	63 U	**39 J**	29 U	0.25 U	53 U	0.25
Vinyl chloride	9.4 U	10 U	9.6 U	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	30 U	0.27 U	63 U	32 U	29 U	0.25 U	53 U	0.25
Vinyl chloride	9.4 U	10 U	9.6 U	0.26 U	0.25 U	0.26 U	0.21 U	0.24 U	30 U	0.27 U	63 U	32 U	29 U	0.25 U	53 U	0.25
Xylene, total	**3.2 J**	10 U	9.6 U	0.77 U	0.76 U	0.79 U	0.62 U	0.73 U	59 U	0.8 U	130 U	64 U	57 U	0.76 U	110 U	0.74
Xylene, total	**3.2 J**	10 U	9.6 U	0.77 U	0.76 U	0.79 U	0.62 U	0.73 U	59 U	0.8 U	130 U	64 U	57 U	0.76 U	110 U	0.74
SVOA(UG/KG)																
1,1-Biphenyl	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2,2'-Oxybis(1-chloropropane)	250 UJ	260 UJ	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2,4,5-Trichlorophenol	490 U	520 U	510 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2,4,6-Trichlorophenol	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2,4-Dichlorophenol	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2,4-Dimethylphenol	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2,4-Dinitrophenol	490 U	520 U	510 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2,4-Dinitrotoluene	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2,6-Dinitrotoluene	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2-Chloronaphthalene	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2-Chlorophenol	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2-Methylnaphthalene	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2-Methylphenol	250 UJ	260 UJ	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2-Nitroaniline	490 U	520 U	510 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2-Nitrophenol	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
3,3'-Dichlorobenzidine	250 UJ	260 UJ	260 UJ	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
3-Nitroaniline	490 U	520 U	510 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
4,6-Dinitro-2-methylphenol	490 U	520 U	510 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
4-Bromophenyl-phenylether	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
4-Chloro-3-methylphenol	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
4-Chloroaniline	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
4-Chlorophenyl-phenylether	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
4-Methylphenol	250 U	260 U	260 UJ	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
4-Nitroaniline	490 U	520 U	510 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
4-Nitrophenol	490 U	520 U	510 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Acenaphthene	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Acenaphthylene	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Acetophenone	250 UJ	260 UJ	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Anthracene	250 U	260 U	260 UJ	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Atrazine	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Benzaldehyde	250 UJ	260 UJ	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Benzo(a)anthracene	62 U	64 U	64 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Benzo(a)pyrene	6.6 U	6.9 U	**1.5 J**	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Benzo(b)fluoranthene	62 U	64 U	**2.3 J**	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Benzo(g,h,i)perylene	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Benzo(k)fluoranthene	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
bis(2-Chloroethoxy)methane	250 UJ	260 UJ	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
bis(2-Chloroethyl)ether	250 UJ	260 UJ	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
bis(2-Ethylhexyl)phthalate	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Butylbenzylphthalate	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Caprolactam	**200 J**	**190 J**	**160 J**	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Carbazole	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Chrysene	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Dibenz(a,h)anthracene	15 U	16 U	16 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Dibenzofuran	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Diethylphthalate	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Dimethyl phthalate	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Di-n-butylphthalate	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Di-n-octylphthalate	410 U	430 U	430 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Fluoranthene	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Fluorene	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Hexachlorobenzene	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Hexachlorobutadiene	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Hexachlorocyclopentadiene	250 U	260 U	260 UJ	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Hexachloroethane	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Indeno(1,2,3-cd)pyrene	62 U	64 U	64 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Isophorone	62 U	64 U	64 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Naphthalene	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
n-Nitroso-di-n-propylamine	31 UJ	33 UJ	33 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
n-Nitrosodiphenylamine	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Nitrobenzene	250 U	260 U	260 UJ	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Pentachlorophenol	65 UJ	72 UJ	70 UJ	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Phenanthrene	250 U	260 U	260 UJ	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Phenol	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Pyrene	250 U	260 U	260 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
METAL(MG/KG)																
Aluminum	14900	17000	15200	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Antimony	0.9 R	0.94 R	0.95 R	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Arsenic	2.1 J	1.5 J	6.8 J	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Barium	21.9	26.2	18.5	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Beryllium	0.167 J	0.192 J	0.18 J	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Cadmium	0.299 U	0.315 U	0.315 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Calcium	103 J	106 J	336	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Chromium	19.8 J	21.3 J	27.8 J	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Cobalt	0.63 J	0.79 J	0.43 J	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Copper	3	4.3	4.2	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Iron	6430 J	4020 J	18400 J	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Lead	14.5	16.4	13.5	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Magnesium	489 J	577 J	704 J	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Manganese	7	9.3	6.9	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Mercury	0.041 U	0.025 J	0.043 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Nickel	1.9	2.1 J	1.7	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Potassium	491 J	568 J	663 J	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Selenium	0.24 J	0.21 J	0.61	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Silver	0.597 U	0.629 U	0.631 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Sodium	299 UJ	315 UJ	277 J	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Thallium	0.48 U	0.5 U	0.5 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Vanadium	30.9 J	15.6 J	40.6 J	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Zinc	6.5	7.2	6.7	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
WCHEM()																
Total organic carbon (TOC) (MG/KG)	NS	NS	NS	5200	1600	1300	1500	1600	NS	8400	18000	17000	4900	9600	19000	14000
Total organic carbon (TOC) (MG/KG)	NS	NS	NS	5200	1600	1300	1500	1600	NS	8400	18000	17000	4900	9600	19000	14000

	IR49-SS08	IR49-SS09	IR49-SS09	IR49-SS10	IR49-SS11	IR49-SS12	IR49-SS12	IR49-SS13
	IR49-SS08-11B	IR49-SS09-11A	IR49-SS09D-11A	IR49-SS10-11A	IR49-SS11-11A	IR49-SS12-11A	IR49-SS12D-11B	IR49-SS13-11B
	4/18/2011	3/28/2011	3/28/2011	3/28/2011	3/28/2011	3/28/2011	4/18/2011	4/18/2011
UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
J	82 U	79 U	82 U	63 U	150 U	410 U	230 U	0.77 U
J	82 U	79 U	82 U	63 U	150 U	410 U	230 U	0.77 U
UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.39 U
UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.39 U
UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.77 U
UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.77 U
UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.77 U
UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.77 U
UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.39 U
UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.39 U
UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
J	82 U	79 U	82 U	63 U	150 U	410 U	230 U	0.77 R
J	82 U	79 U	82 U	63 U	150 U	410 U	230 U	0.77 R
UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
J	160 U	230 U	170 U	170 U	300 U	810 U	470 U	**42 J**
J	160 U	230 U	170 U	170 U	300 U	810 U	470 U	**42 J**
J	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
J	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.77 U
UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.77 U
UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
UJ	82 U	79 U	82 U	63 U	150 U	410 U	230 U	0.77 U
UJ	82 U	79 U	82 U	63 U	150 U	410 U	230 U	0.77 U
J	20 U	**11 J**	**9 J**	**9.5 J**	37 U	**45 J**	58 U	**1.6**
J	20 U	**11 J**	**9 J**	**9.5 J**	37 U	**45 J**	58 U	**1.6**
UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.39 U
UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.39 U
UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
J	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
J	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
J	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
J	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
UJ	**140 J**	**1300**	**1200**	**110 J**	**720 J**	**5000**	**420 J**	0.77 U
UJ	**140 J**	**1300**	**1200**	**110 J**	**720 J**	**5000**	**420 J**	0.77 U
J	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.77 U
J	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.77 U
U	**27 J**	30 U	24 U	24 U	46 U	120 U	**91 J**	0.77 U
U	**27 J**	30 U	24 U	24 U	46 U	120 U	**91 J**	0.77 U
UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U

UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.77 U
UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.77 U
J	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
J	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.77 U
UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.39 U
UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.39 U
UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.77 U
UJ	20 U	20 U	21 U	16 U	37 U	100 U	58 U	0.77 U
J	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
J	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
UJ	41 U	40 U	41 U	32 U	74 U	210 U	120 U	0.39 U
UJ	82 U	79 U	82 U	63 U	150 U	410 U	230 U	1.2 U
UJ	82 U	79 U	82 U	63 U	150 U	410 U	230 U	1.2 U
	NS	NS	NS	NS	NS	NS	NS	NS
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NS	**34000**	NS	**15000**	**97000**	**180000**	NS	NS
NS	**34000**	NS	**15000**	**97000**	**180000**	NS	NS

StationID	IR49-MW01	IR49-MW02	IR49-MW03	IR49-MW04	IR49-MW05	IR49-MW06	IR49-MW07	IR49-MW07	IR49-MW08	IR49-TW01	IR49-TW01	IR49-TW01R	IR49-TW04	IR49-TW05	IR49-TW06	IR49-TW07	IR49-TW08
SampleID	IR49-GW01-11A	IR49-GW02-11A	IR49-GW03-11A	IR49-GW04-11A	IR49-GW05-11A	IR49-GW06-11A	IR49-GW07-11A	IR49-GW07D-11A	IR49-GW08-11A	IR49-TW01-09C	IR49-TW01D-09C	IR49-TW01R-10A	IR49-TW04-10A	IR49-TW05-10A	IR49-TW06-10A	IR49-TW07-10A	IR49-TW08-10A
SampleDate	4/1/2011	4/1/2011	4/2/2011	4/1/2011	4/1/2011	4/1/2011	4/2/2011	4/2/2011	4/2/2011	7/12/2009	7/12/2009	2/18/2010	2/19/2010	2/18/2010	2/18/2010	2/18/2010	2/18/2010
AnalyteName																	
VOA(UG/L)																	
1,1,1-Trichloroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2,2-Tetrachloroethane	**1**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**0.71 J**	**0.86 J**	**1.54**	1 U	1 U	**1.96**	**78.5**	1 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2-Trichloroethane	**0.81 J**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**0.34 J**	**0.37 J**	**1.35**	1 U	1 U	**1.72**	**6.02**	1 U
1,1-Dichloroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U	**0.722 J**	1 U	1 U	**0.39 J**	**0.993 J**	1 U
1,2,4-Trichlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dibromo-3-chloropropane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U
1,2-Dibromoethane	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U	**0.405 J**	**0.345 J**	1 U	**0.62 J**	**0.563 J**	1 U
1,2-Dichloropropane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,3-Dichlorobenzene	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,4-Dichlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U	**0.265 J**	1 U	**0.298 J**	**0.255 J**	1 U	1 U
2-Butanone	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	3 U	3 U	5 U	5 U	5 U	5 U	5 U	5 U
2-Hexanone	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U	5 U	5 U	5 U	5 U	5 U	5 U
4-Methyl-2-pentanone	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U	5 U	5 U	5 U	5 U	5 U	5 U
Acetone	1.8 U	2.7 U	3.9 U	4.4 U	2.2 U	3.7 U	4.6 U	2.4 U	5.3 U	2.5 U	2.5 U	5.5 U	**2.96 J**	**2.64 J**	5.5 U	5.5 U	**6.07**
Benzene	**1**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U	**0.543 J**	1 U	1 U	1 U	**2.47**	**0.188 J**
Bromodichloromethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromoform	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	1 UJ	1 UJ	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U
Bromomethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Carbon disulfide	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	**0.21 J**	1 U	1 U	1 U	1 U	1 U	1 U
Carbon tetrachloride	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroform	0.5 U	**0.25 J**	**0.55 J**	0.5 U	**0.28 J**	**0.34 J**	0.5 U	0.5 U	**0.39 J**	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloromethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	**70**	**2.8**	0.5 U	**0.38 J**	**0.31 J**	**0.61 J**	**0.4 J**	**0.41 J**	0.5 U	**6.8**	**6.9**	**76.5**	**3.77**	**6.4**	**30.3**	**155**	**2.49**
cis-1,3-Dichloropropene	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Cyclohexane	**0.31 J**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U	**2.8**	1 U	1 U	1 U	**3.54**	1 U
Dibromochloromethane	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Dichlorodifluoromethane (Freon-12)	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Ethylbenzene	**0.13 J**	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	1 U	1 U	**0.178 J**	1 U	1 U	1 U	**0.182 J**	1 U
Isopropylbenzene	0.5 U	0.5 U	**0.2 J**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 UJ	1 UJ	**0.443 J**	1 U	1 U	**0.265 J**	**0.522 J**	1 U
Methyl acetate	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U	2 U	2 U	2 U	2 U	2 U	2 U
Methylcyclohexane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U	**3.46**	1 U	1 U	**2.7**	**5.86**	1 U
Methylene chloride	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Methyl-tert-butyl ether (MTBE)	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Styrene	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U	**0.504 J**	1 U	1 U	**1.23**	**1.33**	1 U
Toluene	**0.28 J**	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**0.1 J**	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	**19**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**0.47 J**	**1.3**	**80.7**	**0.982 J**	**2.02**	**22.3**	**108**	**0.655 J**
trans-1,3-Dichloropropene	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethene	**100**	**0.28 J**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**1.6**	**1.6**	**54.7**	1.5 U	1.5 U	**8.81**	**276**	1.5 U
Trichlorofluoromethane (Freon-11)	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Vinyl chloride	**2**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**0.93 J**	**0.89 J**	**3.51**	1 U	**1.05**	**22.1**	**16.8**	1 U
Xylene, total	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	1 U	1 U	2.3 U	2.27 U	2.26 U	2.28 U	2.41 U	2.3 U
SVOA(UG/L)																	
1,1-Biphenyl	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
2,2'-Oxybis(1-chloropropane)	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
2,4,5-Trichlorophenol	NS	NS	NS	NS	NS	NS	NS	NS	NS	23 U	24 U	NS	NS	NS	NS	NS	NS
2,4,6-Trichlorophenol	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
2,4-Dichlorophenol	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
2,4-Dimethylphenol	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
2,4-Dinitrophenol	NS	NS	NS	NS	NS	NS	NS	NS	NS	23 U	24 U	NS	NS	NS	NS	NS	NS
2,4-Dinitrotoluene	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
2,6-Dinitrotoluene	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
2-Chloronaphthalene	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
2-Chlorophenol	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
2-Methylnaphthalene	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
2-Methylphenol	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
2-Nitroaniline	NS	NS	NS	NS	NS	NS	NS	NS	NS	23 U	24 U	NS	NS	NS	NS	NS	NS
2-Nitrophenol	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
3,3'-Dichlorobenzidine	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 UJ	9.8 UJ	NS	NS	NS	NS	NS	NS
3-Nitroaniline	NS	NS	NS	NS	NS	NS	NS	NS	NS	23 U	24 U	NS	NS	NS	NS	NS	NS
4,6-Dinitro-2-methylphenol	NS	NS	NS	NS	NS	NS	NS	NS	NS	23 U	24 U	NS	NS	NS	NS	NS	NS
4-Bromophenyl-phenylether	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
4-Chloro-3-methylphenol	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
4-Chloroaniline	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
4-Chlorophenyl-phenylether	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
4-Methylphenol	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
4-Nitroaniline	NS	NS	NS	NS	NS	NS	NS	NS	NS	23 U	24 U	NS	NS	NS	NS	NS	NS
4-Nitrophenol	NS	NS	NS	NS	NS	NS	NS	NS	NS	23 U	24 U	NS	NS	NS	NS	NS	NS
Acenaphthene	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
Acenaphthylene	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
Acetophenone	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
Anthracene	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
Atrazine	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS

Benzaldehyde	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
Benzo(a)anthracene	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
Benzo(a)pyrene	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
Benzo(b)fluoranthene	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
Benzo(g,h,i)perylene	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
Benzo(k)fluoranthene	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
bis(2-Chloroethoxy)methane	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
bis(2-Chloroethyl)ether	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
bis(2-Ethylhexyl)phthalate	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
Butylbenzylphthalate	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
Caprolactam	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 UJ	9.8 UJ	NS	NS	NS	NS	NS	NS
Carbazole	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
Chrysene	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
Dibenz(a,h)anthracene	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
Dibenzofuran	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
Diethylphthalate	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
Dimethyl phthalate	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
Di-n-butylphthalate	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
Di-n-octylphthalate	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
Fluoranthene	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
Fluorene	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
Hexachlorobenzene	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
Hexachlorobutadiene	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
Hexachlorocyclopentadiene	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
Hexachloroethane	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
Indeno(1,2,3-cd)pyrene	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
Isophorone	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
Naphthalene	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
n-Nitroso-di-n-propylamine	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
n-Nitrosodiphenylamine	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
Nitrobenzene	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
Pentachlorophenol	NS	NS	NS	NS	NS	NS	NS	NS	NS	23 U	24 U	NS	NS	NS	NS	NS	NS
Phenanthrene	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
Phenol	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
Pyrene	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4 U	9.8 U	NS	NS	NS	NS	NS	NS
METAL(UG/L)																	
Aluminum	NS	NS	NS	NS	NS	NS	NS	NS	NS	**1130 J**	**755 J**	NS	NS	NS	NS	NS	NS
Antimony	NS	NS	NS	NS	NS	NS	NS	NS	NS	15 U	15 U	NS	NS	NS	NS	NS	NS
Arsenic	NS	NS	NS	NS	NS	NS	NS	NS	NS	10 U	10 U	NS	NS	NS	NS	NS	NS
Barium	NS	NS	NS	NS	NS	NS	NS	NS	NS	**30.5 J**	**38.8 J**	NS	NS	NS	NS	NS	NS
Beryllium	NS	NS	NS	NS	NS	NS	NS	NS	NS	5 U	5 U	NS	NS	NS	NS	NS	NS
Cadmium	NS	NS	NS	NS	NS	NS	NS	NS	NS	5 U	5 U	NS	NS	NS	NS	NS	NS
Calcium	NS	NS	NS	NS	NS	NS	NS	NS	NS	**12200 J**	**12300 J**	NS	NS	NS	NS	NS	NS
Chromium	NS	NS	NS	NS	NS	NS	NS	NS	NS	**2.5 J**	10 U	NS	NS	NS	NS	NS	NS
Cobalt	NS	NS	NS	NS	NS	NS	NS	NS	NS	15 U	15 U	NS	NS	NS	NS	NS	NS
Copper	NS	NS	NS	NS	NS	NS	NS	NS	NS	10 U	10 U	NS	NS	NS	NS	NS	NS
Iron	NS	NS	NS	NS	NS	NS	NS	NS	NS	**4040**	**3000**	NS	NS	NS	NS	NS	NS
Lead	NS	NS	NS	NS	NS	NS	NS	NS	NS	3 U	3 U	NS	NS	NS	NS	NS	NS
Magnesium	NS	NS	NS	NS	NS	NS	NS	NS	NS	**2040 J**	**2040 J**	NS	NS	NS	NS	NS	NS
Manganese	NS	NS	NS	NS	NS	NS	NS	NS	NS	**33.2**	**51.7**	NS	NS	NS	NS	NS	NS
Mercury	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.2 UJ	0.2 UJ	NS	NS	NS	NS	NS	NS
Nickel	NS	NS	NS	NS	NS	NS	NS	NS	NS	**8.3 J**	**14.2**	NS	NS	NS	NS	NS	NS
Potassium	NS	NS	NS	NS	NS	NS	NS	NS	NS	**1060 J**	**1070 J**	NS	NS	NS	NS	NS	NS
Selenium	NS	NS	NS	NS	NS	NS	NS	NS	NS	5 U	5 U	NS	NS	NS	NS	NS	NS
Silver	NS	NS	NS	NS	NS	NS	NS	NS	NS	10 U	10 U	NS	NS	NS	NS	NS	NS
Sodium	NS	NS	NS	NS	NS	NS	NS	NS	NS	**27700 J**	**31500 J**	NS	NS	NS	NS	NS	NS
Thallium	NS	NS	NS	NS	NS	NS	NS	NS	NS	2 U	2 U	NS	NS	NS	NS	NS	NS
Vanadium	NS	NS	NS	NS	NS	NS	NS	NS	NS	15 U	15 U	NS	NS	NS	NS	NS	NS
Zinc	NS	NS	NS	NS	NS	NS	NS	NS	NS	**6.7 J**	**11 J**	NS	NS	NS	NS	NS	NS
WCHEM()																	
Total organic carbon (TOC) (UG/L)	**980**	**1100**	**2600**	**2200**	**1100**	**970**	**1600**	NS	**1800**	NS	NS	NS	NS	NS	NS	NS	NS

StationID	IR49-MW01	IR49-MW02	IR49-MW03	IR49-MW04	IR49-MW05	IR49-MW06	IR49-MW07	IR49-MW07	IR49-MW08	IR49-TW01	IR49-TW01	IR49-TW01R	IR49-TW04	IR49-TW05	IR49-TW06	IR49-TW07	IR49-TW08
SampleID	IR49-GW01-11A	IR49-GW02-11A	IR49-GW03-11A	IR49-GW04-11A	IR49-GW05-11A	IR49-GW06-11A	IR49-GW07-11A	IR49-GW07D-11A	IR49-GW08-11A	IR49-TW01-09C	IR49-TW01D-09C	IR49-TW01R-10A	IR49-TW04-10A	IR49-TW05-10A	IR49-TW06-10A	IR49-TW07-10A	IR49-TW08-10A
SampleDate	4/1/2011	4/1/2011	4/2/2011	4/1/2011	4/1/2011	4/1/2011	4/2/2011	4/2/2011	4/2/2011	7/12/2009	7/12/2009	2/18/2010	2/19/2010	2/18/2010	2/18/2010	2/18/2010	2/18/2010
AnalyteName																	
VOA(UG/L)																	
1,1,2,2-Tetrachloroethane	**1**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**0.71 J**	**0.86 J**	**1.54**	1 U	1 U	**1.96**	**78.5**	1 U
1,1,2-Trichloroethane	**0.81 J**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**0.34 J**	**0.37 J**	**1.35**	1 U	1 U	**1.72**	**6.02**	1 U
1,1-Dichloroethene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U	**0.722 J**	1 U	1 U	**0.39 J**	**0.993 J**	1 U
1,2-Dichloroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U	**0.405 J**	**0.345 J**	1 U	**0.62 J**	**0.563 J**	1 U
1,4-Dichlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U	**0.265 J**	1 U	**0.298 J**	**0.255 J**	1 U	1 U
Acetone	1.8 U	2.7 U	3.9 U	4.4 U	2.2 U	3.7 U	4.6 U	2.4 U	5.3 U	2.5 U	2.5 U	5.5 U	**2.96 J**	**2.64 J**	5.5 U	5.5 U	**6.07**
Benzene	**1**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U	**0.543 J**	1 U	1 U	1 U	**2.47**	**0.188 J**
Carbon disulfide	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	**0.21 J**	1 U	1 U	1 U	1 U	1 U	1 U
Chloroform	0.5 U	**0.25 J**	**0.55 J**	0.5 U	**0.28 J**	**0.34 J**	0.5 U	0.5 U	**0.39 J**	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	**70**	**2.8**	0.5 U	**0.38 J**	**0.31 J**	**0.61 J**	**0.4 J**	**0.41 J**	0.5 U	**6.8**	**6.9**	**76.5**	**3.77**	**6.4**	**30.3**	**155**	**2.49**
Cyclohexane	**0.31 J**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U	**2.8**	1 U	1 U	1 U	**3.54**	1 U
Ethylbenzene	**0.13 J**	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	1 U	1 U	**0.178 J**	1 U	1 U	1 U	**0.182 J**	1 U
Isopropylbenzene	0.5 U	0.5 U	**0.2 J**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 UJ	1 UJ	**0.443 J**	1 U	1 U	**0.265 J**	**0.522 J**	1 U
Methylcyclohexane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U	**3.46**	1 U	1 U	**2.7**	**5.86**	1 U
Tetrachloroethene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U	**0.504 J**	1 U	1 U	**1.23**	**1.33**	1 U
Toluene	**0.28 J**	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**0.1 J**	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	**19**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**0.47 J**	**1.3**	**80.7**	**0.982 J**	**2.02**	**22.3**	**108**	**0.655 J**
Trichloroethene	**100**	**0.28 J**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**1.6**	**1.6**	**54.7**	1.5 U	1.5 U	**8.81**	**276**	1.5 U
Vinyl chloride	**2**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**0.93 J**	**0.89 J**	**3.51**	1 U	**1.05**	**22.1**	**16.8**	1 U
SVOA(UG/L)																	
No Detections																	
METAL(UG/L)																	
Aluminum	NS	NS	NS	NS	NS	NS	NS	NS	NS	**1130 J**	**755 J**	NS	NS	NS	NS	NS	NS
Barium	NS	NS	NS	NS	NS	NS	NS	NS	NS	**30.5 J**	**38.8 J**	NS	NS	NS	NS	NS	NS
Calcium	NS	NS	NS	NS	NS	NS	NS	NS	NS	**12200 J**	**12300 J**	NS	NS	NS	NS	NS	NS
Chromium	NS	NS	NS	NS	NS	NS	NS	NS	NS	**2.5 J**	10 U	NS	NS	NS	NS	NS	NS
Iron	NS	NS	NS	NS	NS	NS	NS	NS	NS	**4040**	**3000**	NS	NS	NS	NS	NS	NS
Magnesium	NS	NS	NS	NS	NS	NS	NS	NS	NS	**2040 J**	**2040 J**	NS	NS	NS	NS	NS	NS
Manganese	NS	NS	NS	NS	NS	NS	NS	NS	NS	**33.2**	**51.7**	NS	NS	NS	NS	NS	NS
Nickel	NS	NS	NS	NS	NS	NS	NS	NS	NS	**8.3 J**	**14.2**	NS	NS	NS	NS	NS	NS
Potassium	NS	NS	NS	NS	NS	NS	NS	NS	NS	**1060 J**	**1070 J**	NS	NS	NS	NS	NS	NS
Sodium	NS	NS	NS	NS	NS	NS	NS	NS	NS	**27700 J**	**31500 J**	NS	NS	NS	NS	NS	NS
Zinc	NS	NS	NS	NS	NS	NS	NS	NS	NS	**6.7 J**	**11 J**	NS	NS	NS	NS	NS	NS
WCHEM()																	
Total organic carbon (TOC) (UG/L)	**980**	**1100**	**2600**	**2200**	**1100**	**970**	**1600**	NS	**1800**	NS	NS	NS	NS	NS	NS	NS	NS

Appendix F
Human Health Risk Assessment

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TABLE 1.1

Selection of Exposure Pathways

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current	Surface Soil	Surface Soil	Surface Soil	Site Worker	Adult	Ingestion	On-site	Quant	The building adjacent to the site is currently used for storage and the grassy area is manicured lawn. Workers accessing the site or performing groundskeeping activities could contact surface soil.
						Dermal Absorption	On-site	Quant	The building adjacent to the site is currently used for storage and the grassy area is manicured lawn. Workers accessing the site or performing groundskeeping activities could contact surface soil.
				Trespasser/Visitor	Adult	Ingestion	On-site	Quant	Access to site is unrestricted (site is not fenced), trespasser/visitor could contact site surface soil.
						Dermal Absorption	On-site	Quant	Access to site is unrestricted (site is not fenced), trespasser/visitor could contact site surface soil.
					Youth	Ingestion	On-site	Quant	Access to site is unrestricted (site is not fenced), trespasser/visitor could contact site surface soil.
						Dermal Absorption	On-site	Quant	Access to site is unrestricted (site is not fenced), trespasser/visitor could contact site surface soil.
		Air	Emissions from Surface Soil	Site Worker	Adult	Inhalation	On-site	Quant	The building adjacent to the site is currently used for storage and the grassy area is manicured lawn. Workers accessing the site or performing groundskeeping activities could inhale vapors and dust from the surface soil.
				Trespasser/Visitor	Adult	Inhalation	On-site	Quant	Access to site is unrestricted (site is not fenced), trespasser/visitor could inhale vapors and dust from site surface soil.
					Youth	Inhalation	On-site	Quant	Access to site is unrestricted (site is not fenced), trespasser/visitor could inhale vapors and dust from site surface soil.
Current/Future	Surface Water	Surface Water	Drainage Ditches	Site Worker	Adult	Ingestion	On-site	Quant	Workers performing groundskeeping or maintenance activities at the site could contact surface water in drainage ditches.
						Dermal Absorption	On-site	Quant	Workers performing groundskeeping or maintenance activities at the site could contact surface water in drainage ditches.
				Trespasser/Visitor	Adult	Ingestion	On-site	Quant	Access to site is unrestricted (site is not fenced), trespasser/visitor could contact surface water in drainage ditches.
						Dermal Absorption	On-site	Quant	Access to site is unrestricted (site is not fenced), trespasser/visitor could contact surface water in drainage ditches.
					Youth	Ingestion	On-site	Quant	Access to site is unrestricted (site is not fenced), trespasser/visitor could contact surface water in drainage ditches.
						Dermal Absorption	On-site	Quant	Access to site is unrestricted (site is not fenced), trespasser/visitor could contact surface water in drainage ditches.
	Pore Water[1]	Surface Water	New River	Recreational User	Adult	Ingestion	On-site	Quant	Recreational users of the New River could contact surface water (represented by pore water data) in the river.[1]
						Dermal Absorption	On-site	Quant	Recreational users of the New River could contact surface water (represented by pore water data) in the river.[1]

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TABLE 1.1

Selection of Exposure Pathways

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current/Future	Pore Water[1]	Surface Water	New River	Recreational User	Youth	Ingestion	On-site	Quant	Recreational users of the New River could contact surface water (represented by pore water data) in the river.[1]
						Dermal Absorption	On-site	Quant	Recreational users of the New River could contact surface water (represented by pore water data) in the river.[1]
					Child	Ingestion	On-site	Quant	Recreational users of the New River could contact surface water (represented by pore water data) in the river.[1]
						Dermal Absorption	On-site	Quant	Recreational users of the New River could contact surface water (represented by pore water data) in the river.[1]
	Sediment	Sediment	Drainage Ditches	Site Worker	Adult	Ingestion	On-site	Quant	Workers performing groundskeeping or maintenance activities at the site could contact sediment in drainage ditches.
						Dermal Absorption	On-site	Quant	Workers performing groundskeeping or maintenance activities at the site could contact sediment in drainage ditches.
				Trespasser/Visitor	Adult	Ingestion	On-site	Quant	Access to site is unrestricted (site is not fenced), trespasser/visitor could contact sediment in drainage ditches.
						Dermal Absorption	On-site	Quant	Access to site is unrestricted (site is not fenced), trespasser/visitor could contact sediment in drainage ditches.
					Youth	Ingestion	On-site	Quant	Access to site is unrestricted (site is not fenced), trespasser/visitor could contact sediment in drainage ditches.
						Dermal Absorption	On-site	Quant	Access to site is unrestricted (site is not fenced), trespasser/visitor could contact sediment in drainage ditches.
			New River	Recreational User	Adult	Ingestion	On-site	Quant	Recreational users of the New River could contact sediment in the river.
						Dermal Absorption	On-site	Quant	Recreational users of the New River could contact sediment in the river.
					Youth	Ingestion	On-site	Quant	Recreational users of the New River could contact sediment in the river.
						Dermal Absorption	On-site	Quant	Recreational users of the New River could contact sediment in the river.
					Child	Ingestion	On-site	Quant	Recreational users of the New River could contact sediment in the river.
						Dermal Absorption	On-site	Quant	Recreational users of the New River could contact sediment in the river.
Future	Soil[2]	Soil[2]	Soil[2]	Resident	Adult	Dermal Absorption	On-site	Quant	Although unlikely, if site used for future residential development, residents could contact soil[2]
						Ingestion	On-site	Quant	Although unlikely, if site used for future residential development, residents could contact soil[2]
					Child	Dermal Absorption	On-site	Quant	Although unlikely, if site used for future residential development, residents could contact soil[2]
						Ingestion	On-site	Quant	Although unlikely, if site used for future residential development, residents could contact soil[2]
					Child/Adult	Dermal Absorption	On-site	Quant	Although unlikely, if site used for future residential development, residents could contact soil[2]
						Ingestion	On-site	Quant	Although unlikely, if site used for future residential development, residents could contact soil[2]

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TABLE 1.1

Selection of Exposure Pathways

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Future	Soil[2]	Soil[2]	Soil[2]	Construction Worker	Adult	Ingestion	On-site	Quant	Future construction workers could contact soil[2] while performing activities at the site.
						Dermal Absorption	On-site	Quant	Future construction workers could contact soil[2] while performing activities at the site.
				Industrial Worker	Adult	Ingestion	On-site	Quant	Future industrial workers could contact soil[2] while performing activities at the site.
						Dermal Absorption	On-site	Quant	Future industrial workers could contact soil[2] while performing activities at the site.
				Site Worker	Adult	Ingestion	On-site	Quant	Future site workers could contact soil[2] while performing activities at the site.
						Dermal Absorption	On-site	Quant	Future site workers could contact soil[2] while performing activities at the site.
				Trespasser/Visitor	Adult	Dermal Absorption	On-site	Quant	Access to site unlimited for people on base, trespasser/visitor could contact site soil[2]
						Ingestion	On-site	Quant	Access to site unlimited for people on base, trespasser/visitor could contact site soil[2]
					Youth	Dermal Absorption	On-site	Quant	Access to site unlimited for people on base, trespasser/visitor could contact site soil[2]
						Ingestion	On-site	Quant	Access to site unlimited for people on base, trespasser/visitor could contact site soil[2]
		Air	Emissions from Soil[2]	Resident	Adult	Inhalation	On-site	Quant	If site used for future residential development, residents could inhale vapors and dust from soil[2]
					Child	Inhalation	On-site	Quant	If site used for future residential development, residents could inhale vapors and dust from soil[2]
					Child/Adult	Inhalation	On-site	Quant	If site used for future residential development, residents could inhale vapors and dust from soil[2]
				Construction Worker	Adult	Inhalation	On-site	Quant	Exposure to emissions from soil* during future construction activities.
				Industrial Worker	Adult	Inhalation	On-site	Quant	Industrial workers may inhale vapors and dust from areas of site disturbed soil[2] during activities at the site.
				Site Worker	Adult	Inhalation	On-site	Quant	Site workers may inhale vapors and dust from areas of site disturbed soil[2] during activities at the site.
				Trespasser/Visitor	Adult	Inhalation	On-site	Quant	Access to site unlimited for people on base, trespasser/visitor could be exposed to dust and vapors in air from site soil[2].
					Youth	Inhalation	On-site	Quant	Access to site unlimited for people on base, trespasser/visitor could be exposed to dust and vapors in air from site soil[2].
	Surface Water	Surface Water	Drainage Ditches	Construction Worker	Adult	Ingestion	On-site	Quant	Construction workers could contact site surface water during construction activities.
						Dermal Absorption	On-site	Quant	Construction workers could contact site surface water during construction activities.

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TABLE 1.1

Selection of Exposure Pathways

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Future	Sediment	Sediment	Drainage Ditches	Construction Worker	Adult	Ingestion	On-site	Quant	Construction workers could contact site sediment during construction activities.
						Dermal Absorption	On-site	Quant	Construction workers could contact site sediment during construction activities.
	Groundwater	Groundwater	Tap Water	Residential	Adult	Ingestion	On-site	Quant	Although unlikely, groundwater may be used as future potable water supply.
						Dermal Absorption	On-site	Quant	Although unlikely, groundwater may be used as future potable water supply. The adult is assumed to shower.
					Child	Ingestion	On-site	Quant	Although unlikely, groundwater may be used as future potable water supply.
						Dermal Absorption	On-site	Quant	Although unlikely, groundwater may be used as future potable water supply. The child is assumed to bathe.
					Child/Adult	Ingestion	On-site	Quant	Although unlikely, groundwater may be used as future potable water supply.
						Dermal Absorption	On-site	Quant	Although unlikely, groundwater may be used as future potable water supply. The aggregate resident is assumed to shower.
				Industrial Worker	Adult	Ingestion	On-site	Quant	Future industrial workers may use groundwater as a potable source.
						Dermal Absorption	On-site	None	Assumed industrial workers would not shower regularly at site even if groundwater used as a potable water supply.
				Site Worker	Adult	Ingestion	On-site	None	Site worker is not expected to come into contact with groundwater.
						Dermal Absorption	On-site	None	Site worker is not expected to come into contact with groundwater.
			Water in Excavation Pit	Construction Worker	Adult	Dermal Absorption	On-site	Quant	Future construction workers could come into direct contact with groundwater during excavation activities.
						Ingestion	On-site	None	Future construction workers could come into direct contact with groundwater during excavation activities, however, ingestion is expected to be negligible
		Air	Water Vapors at Showerhead	Residential	Adult	Inhalation	On-site	Quant	Although unlikely, groundwater may be used as future potable water supply. Residents may inhale volatiles from groundwater during showering or bathing.
					Child	Inhalation	On-site	Quant	Although unlikely, groundwater may be used as future potable water supply. Residents may inhale volatiles from groundwater during showering or bathing.
					Child/Adult	Inhalation	On-site	Quant	Although unlikely, groundwater may be used as future potable water supply. Residents may inhale volatiles from groundwater during showering or bathing.
				Industrial Worker	Adult	Inhalation	On-site	None	Although unlikely, groundwater may be used as future potable water supply. Residents may inhale volatiles from groundwater during showering or bathing.
				Site Worker	Adult	Inhalation	On-site	None	Site worker is not expected to come into contact with groundwater.
			Water Vapors in Excavation Pit	Construction Worker	Adult	Inhalation	On-site	Quant	Future construction worker may inhale vapors from groundwater during excavation activities.

[1]porewater : Recreational users of the New River could contact surface water in the river. Surface water samples were not collected from the river. However, porewater samples collected from locations near the southern shoreline of the New River to assess the water quality of the groundwater discharging to the surface water were conservatively used to represent potential surface water concentrations. It is likely that actual surface water concentrations would be lower due to dilution of the pore water in the New River surface water.

[2]soil : combined surface and subsurface soil.

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TABLE 2.11 Supplement A

Development of Target Groundwater Concentrations for Protection of Industrial Air

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Parameter	Symbol	Value
Henry's Law Constant	H	chem-specific
Empirical Attenuation Factor	alpha	1.0E-03

CAS	Chemical	Cancer based Concentration in Indoor Air ($\mu g/m^3$) (1)	Non-cancer based Concentration in Indoor Air ($\mu g/m^3$) (1)	Target Concentration in Indoor Air ($\mu g/m^3$) (1)	key	Concentration in Soil Gas ($\mu g/m^3$)	Henry's Law Constant (2)	Target Concentration in Groundwater ($\mu g/m^3$)	Target Concentration in Groundwater ($\mu g/L$)
79-34-5	1,1,2,2-Tetrachloroethane	2.10E-01		2.10E-01	ca	2.10E+02	9.06E-03	2.32E+04	2.32E+01
79-00-5	1,1,2-Trichloroethane	7.70E-01	8.80E-02	8.80E-02	nc	8.80E+01	2.14E-02	4.12E+03	4.12E+00
75-35-4	1,1-Dichloroethene		8.80E+01	8.80E+01	nc	8.80E+04	8.24E-01	1.07E+05	1.07E+02
107-06-2	1,2-Dichloroethane	4.70E-01	3.10E+00	4.70E-01	ca	4.70E+02	3.41E-02	1.38E+04	1.38E+01
106-46-7	1,4-Dichlorobenzene	1.10E+00	3.50E+02	1.10E+00	ca	1.10E+03	5.74E-02	1.92E+04	1.92E+01
67-64-1	Acetone		1.40E+04	1.40E+04	nc	1.40E+07	1.01E-03	1.39E+10	1.39E+07
71-43-2	Benzene	1.60E+00	1.30E+01	1.60E+00	ca	1.60E+03	1.55E-01	1.03E+04	1.03E+01
75-15-0	Carbon disulfide		3.10E+02	3.10E+02	nc	3.10E+05	4.49E-01	6.90E+05	6.90E+02
67-66-3	Chloroform	5.30E-01	4.30E+01	5.30E-01	ca	5.30E+02	1.10E-01	4.81E+03	4.81E+00
156-59-2	cis-1,2-Dichloroethene			6.30E+00	nc	6.30E+03	1.21E-01	4.11E+04	4.11E+01
110-82-7	Cyclohexane		2.60E+03	2.60E+03	nc	2.60E+06	N/A	N/A	N/A
100-41-4	Ethylbenzene	4.90E+00	4.40E+02	4.90E+00	ca	4.90E+03	1.98E-01	2.47E+04	2.47E+01
98-82-8	Isopropylbenzene		1.80E+02	1.80E+02	nc	1.80E+05	2.55E-01	7.05E+05	7.05E+02
108-87-2	Methylcyclohexane			3.10E+02	nc	3.10E+05	6.27E+01	4.94E+03	4.94E+00
127-18-4	Tetrachloroethene	2.10E+00	1.20E+02	2.10E+00	ca	2.10E+03	4.85E-01	4.33E+03	4.33E+00
108-88-3	Toluene		2.20E+03	2.20E+03	nc	2.20E+06	1.76E-01	1.25E+07	1.25E+04
156-60-5	trans-1,2-Dichloroethene		2.60E+01	2.60E+01	nc	2.60E+04	1.25E-01	2.08E+05	2.08E+02
79-01-6	Trichloroethene	6.10E+00	4.40E+00	4.40E+00	nc	4.40E+03	2.69E-01	1.63E+04	1.63E+01
75-01-4	Vinyl chloride	2.80E+00	4.40E+01	2.80E+00	ca	2.80E+03	9.36E-01	2.99E+03	2.99E+00

(1) Concentration in indoor air based on USEPA Industrial Indoor Air RSL (based on ELCR = 1×10^{-6} or HI = 0.1).

(2) Dimensionless Henry's Law Constant at System Temperature

$$C_{gw}\ [\mu g/L] = C_{target,ia}\ (\mu g/m^3) * 10^{-3}\ m^3/L * 1/H'_{TS} * 1/\alpha$$

where,

C_{gw} Target groundwater concentration (i.e., GWSL),

$C_{target,i}$ Target indoor air concentration (i.e., RSLs for industrial air),

α Attenuation factor ([AF] default ratio of indoor air concentration to source vapor concentration; 1×10^{-3}), and

H'_{TS} Henry's law constant at system (groundwater) temperature (dimensionless)

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TABLE 2.1

Occurrence, Distribution And Selection of Chemicals of Potential Concern

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Surface Soil	71-55-6	1,1,1-Trichloroethane	ND	ND	MG/KG		0/13	0.002 - 0.41	4.1E-01	N/A	6.4E+02 NS	1.2E+00	NCSSL	NO	DLBSL
	79-34-5	1,1,2,2-Tetrachloroethane	8.6E-04 J	8.6E-04 J	MG/KG	IR49-SS07-11A	1/13	0.002 - 0.41	8.6E-04	N/A	5.6E-01 C	1.2E-03	NCSSL	NO	BSL
	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-11	ND	ND	MG/KG		0/13	0.0049 - 2.1	2.1E+00	N/A	9.1E+02 N	9.2E+03	NCSSL	NO	DLBSL
	79-00-5	1,1,2-Trichloroethane	ND	ND	MG/KG		0/13	0.002 - 0.41	4.1E-01	N/A	1.6E-01 C*	N/A		YES	DLASL
	75-34-3	1,1-Dichloroethane	ND	ND	MG/KG		0/13	0.002 - 0.41	4.1E-01	N/A	3.3E+00 C	3.0E-02	NCSSL	NO	DLBSL
	75-35-4	1,1-Dichloroethene	ND	ND	MG/KG		0/13	0.002 - 0.41	4.1E-01	N/A	2.4E+01 N	4.6E-02	NCSSL	NO	DLBSL
	120-82-1	1,2,4-Trichlorobenzene	ND	ND	MG/KG		0/13	0.002 - 0.82	8.2E-01	N/A	6.2E+00 C*	2.2E+00	NCSSL	NO	DLBSL
	96-12-8	1,2-Dibromo-3-chloropropane	ND	ND	MG/KG		0/13	0.0049 - 2.1	2.1E+00	N/A	5.4E-03 C	2.5E-04	NCSSL	YES	DLASL
	106-93-4	1,2-Dibromoethane	ND	ND	MG/KG		0/13	0.0029 - 0.41	4.1E-01	N/A	3.4E-02 C	9.7E-05	NCSSL	YES	DLASL
	95-50-1	1,2-Dichlorobenzene	ND	ND	MG/KG		0/13	0.00098 - 0.41	4.1E-01	N/A	1.9E+02 N	2.4E-01	NCSSL	NO	DLBSL
	107-06-2	1,2-Dichloroethane	ND	ND	MG/KG		0/13	0.00098 - 0.41	4.1E-01	N/A	4.3E-01 C*	2.0E-03	NCSSL	NO	DLBSL
	78-87-5	1,2-Dichloropropane	ND	ND	MG/KG		0/13	0.0029 - 0.41	4.1E-01	N/A	9.4E-01 C*	3.3E-03	NCSSL	NO	DLBSL
	541-73-1	1,3-Dichlorobenzene	ND	ND	MG/KG		0/13	0.00098 - 0.41	4.1E-01	N/A	2.4E+00 C	7.6E+00	NCSSL	NO	DLBSL
	106-46-7	1,4-Dichlorobenzene	ND	ND	MG/KG		0/13	0.00098 - 0.41	4.1E-01	N/A	2.4E+00 C	7.0E-02	NCSSL	NO	DLBSL
	78-93-3	2-Butanone	7.3E-03 J	1.5E-02 J	MG/KG	IR49-SS07-11A	2/12	0.0098 - 21	1.5E-02	N/A	2.8E+03 N	1.6E+01	NCSSL	NO	BSL
	591-78-6	2-Hexanone	ND	ND	MG/KG		0/13	0.0098 - 21	2.1E+01	N/A	2.1E+01 N	1.2E+00	NCSSL	YES	DLASL
	108-10-1	4-Methyl-2-pentanone	ND	ND	MG/KG		0/13	0.0098 - 21	2.1E+01	N/A	5.3E+02 N	N/A		NO	DLBSL
	67-64-1	Acetone	4.2E-02 J	2.2E-01 J	MG/KG	IR49-SS07-11A	3/13	0.015 - 6.2	2.2E-01	N/A	6.1E+03 N	2.4E+01	NCSSL	NO	BSL
	71-43-2	Benzene	1.9E-03 J	1.9E-03 J	MG/KG	IR49-SS07-11A	1/13	0.00098 - 0.41	1.9E-03	N/A	1.1E+00 C*	7.3E-03	NCSSL	NO	BSL
	75-27-4	Bromodichloromethane	ND	ND	MG/KG		0/13	0.00098 - 0.41	4.1E-01	N/A	2.7E-01 C	2.9E-03	NCSSL	YES	DLASL
	75-25-2	Bromoform	ND	ND	MG/KG		0/13	0.002 - 0.41	4.1E-01	N/A	6.2E+01 C*	1.9E-02	NCSSL	NO	DLBSL
	74-83-9	Bromomethane	ND	ND	MG/KG		0/13	0.0039 - 0.41	4.1E-01	N/A	7.3E-01 N	N/A		NO	DLBSL
	75-15-0	Carbon disulfide	6.8E-04 J	4.5E-02 J	MG/KG	IR49-SS12-11A	7/13	0.00098 - 2.1	4.5E-02	N/A	8.2E+01 N	3.8E+00	NCSSL	NO	BSL
	56-23-5	Carbon tetrachloride	ND	ND	MG/KG		0/13	0.002 - 0.41	4.1E-01	N/A	6.1E-01 C	2.0E-03	NCSSL	NO	DLBSL
	108-90-7	Chlorobenzene	ND	ND	MG/KG		0/13	0.00098 - 0.41	4.1E-01	N/A	2.9E+01 N	4.5E-01	NCSSL	NO	DLBSL
	75-00-3	Chloroethane	ND	ND	MG/KG		0/13	0.002 - 0.41	4.1E-01	N/A	1.5E+03 N	1.6E+01	NCSSL	NO	DLBSL
	67-66-3	Chloroform	ND	ND	MG/KG		0/13	0.00098 - 0.41	4.1E-01	N/A	2.9E-01 C	3.4E-01	NCSSL	YES	DLASL
	74-87-3	Chloromethane	ND	ND	MG/KG		0/13	0.00098 - 0.41	4.1E-01	N/A	1.2E+01 N	1.5E-02	NCSSL	NO	DLBSL
	156-59-2	cis-1,2-Dichloroethene	ND	ND	MG/KG		0/13	0.00098 - 0.41	4.1E-01	N/A	1.6E+01 N	3.6E-01	NCSSL	NO	DLBSL
	10061-01-5	cis-1,3-Dichloropropene	ND	ND	MG/KG		0/13	0.00098 - 0.41	4.1E-01	N/A	1.7E+00 C*	2.3E-03	NCSSL	NO	DLBSL
	110-82-7	Cyclohexane	9.8E-04 J	9.8E-04 J	MG/KG	IR49-SS07-11A	1/13	0.0049 - 2.1	9.8E-04	N/A	1.2E+02 NS	N/A		NO	BSL

Appendix F

TABLE 2.1

Occurrence, Distribution And Selection of Chemicals of Potential Concern

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
	124-48-1	Dibromochloromethane	ND	ND	MG/KG		0/13	0.00098 - 0.41	4.1E-01	N/A	6.8E-01 C	1.9E-03	NCSSL	NO	DLBSL
	75-71-8	Dichlorodifluoromethane (Freon-12)	ND	ND	MG/KG		0/13	0.002 - 0.41	4.1E-01	N/A	9.4E+00 N	2.9E+01	NCSSL	NO	DLBSL
	100-41-4	Ethylbenzene	2.7E-03 J	2.7E-03 J	MG/KG	IR49-SS07-11A	1/13	0.00098 - 0.41	2.7E-03	N/A	5.4E+00 C	8.1E+00	NCSSL	NO	BSL
	98-82-8	Isopropylbenzene	ND	ND	MG/KG		0/13	0.00098 - 0.41	4.1E-01	N/A	2.1E+02 N	1.3E+00	NCSSL	NO	DLBSL
	79-20-9	Methyl acetate	2.1E-03 J	5.0E+00 J	MG/KG	IR49-SS12-11A	10/13	0.0049 - 2.1	5.0E+00	N/A	7.8E+03 N	N/A		NO	BSL
	108-87-2	Methylcyclohexane	1.1E-03 J	1.1E-03 J	MG/KG	IR49-SS07-11A	1/13	0.0049 - 2.1	1.1E-03	N/A	5.7E+01 N	N/A		NO	BSL
	75-09-2	Methylene chloride	2.7E-02 J	9.1E-02 J	MG/KG	IR49-SS12D-11B	2/13	0.015 - 2.1	9.1E-02	N/A	1.1E+01 C	2.3E-02	NCSSL	NO	BSL
	1634-04-4	Methyl-tert-butyl ether (MTBE)	ND	ND	MG/KG		0/13	0.00098 - 0.41	4.1E-01	N/A	4.3E+01 C	8.5E-02	NCSSL	NO	DLBSL
	100-42-5	Styrene	ND	ND	MG/KG		0/13	0.00098 - 0.41	4.1E-01	N/A	6.3E+02 N	9.2E-01	NCSSL	NO	DLBSL
	127-18-4	Tetrachloroethene	ND	ND	MG/KG		0/13	0.002 - 0.41	4.1E-01	N/A	5.5E-01 C	5.0E-03	NCSSL	NO	DLBSL
	108-88-3	Toluene	9.8E-04 J	3.0E-03 J	MG/KG	IR49-SS07-11A	2/13	0.002 - 0.41	3.0E-03	N/A	5.0E+02 N	5.5E+00	NCSSL	NO	BSL
	156-60-5	trans-1,2-Dichloroethene	ND	ND	MG/KG		0/13	0.00098 - 0.41	4.1E-01	N/A	1.5E+01 N	5.1E-01	NCSSL	NO	DLBSL
	10061-02-6	trans-1,3-Dichloropropene	ND	ND	MG/KG		0/13	0.0029 - 0.41	4.1E-01	N/A	1.7E+00 C*	2.3E-03	NCSSL	NO	DLBSL
	79-01-6	Trichloroethene	1.3E-03 J	4.7E-03 J	MG/KG	IR49-SS07-11A	2/13	0.002 - 0.41	4.7E-03	N/A	2.5E+00 C**	1.8E-02	NCSSL	NO	BSL
	75-69-4	Trichlorofluoromethane (Freon-11)	3.9E-02 J	3.9E-02 J	MG/KG	IR49-SS03-11A	1/13	0.002 - 0.41	3.9E-02	N/A	7.9E+01 N	2.4E+01	NCSSL	NO	BSL
	75-01-4	Vinyl chloride	ND	ND	MG/KG		0/13	0.00098 - 0.41	4.1E-01	N/A	6.0E-02 C	1.9E-04	NCSSL	YES	DLASL
	1330-20-7	Xylene, total	ND	ND	MG/KG		0/13	0.0029 - 1.2	1.2E+00	N/A	6.3E+01 N	6.0E+00	NCSSL	NO	DLBSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening. If not detected, maximum detection limit used for screening.

[3] Background values are two times the arithmetic mean basewide background surface soil concentrations.

[4] Oak Ridge National Laboratory (ORNL). June, 2011. Regional Screening Levels for Chemical Contaminants at Superfund Sites. [Online]. Adjusted (RSLs based on non-cancer (N) divided by 10) residential soil RSLs. Available: http://epa-prgs.ornl.gov/chemicals/index.shtml

RSL value for 1,4-dichlorobenzene used as a surrogate for 1,3-dichlorobenzene.

RSL value for 1,3-dichloropropene used as a surrogate for cis-1,3-dichloropropene and trans-1,3-dichloropropene.

RSL for n-hexane used as surrogate for methylcyclohexane.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Detection Limit Above Screening Level (DLASL), not quantitatively evaluated in HHRA

Deletion Reason: No Toxicity Information (NTX)

Essential Nutrient (NUT)

Below Screening Level (BSL)

Detection Limit Below Screening Level (DLBSL)

COPC = Chemical of Potential Concern

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered

J = Estimated Value

C = Carcinogenic

C* = N screening level < 100x C screening level, therefore C screening value used

C** = N screening level < 10x C screening level, therefore N screening value/10 used as screening level

N = Noncarcinogenic

S = noncarcinogenic based RSL higher than saturation concentration, therefore, soil saturation concentration used as screening level

NCSSL = North Carolina Soil Screening Levels (NCDENR, 2010)

N/A = Not applicable/not available

Appendix F

TABLE 2.2

Occurrence, Distribution And Selection of Chemicals of Potential Concern

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Air

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Emissions from Surface Soil	71-55-6	1,1,1-Trichloroethane	ND	ND	$\mu g/m^3$		0/13	--	2.0E-01	N/A	5.2E+02 N	N/A	N/A	NO	DLBSL
	79-34-5	1,1,2,2-Tetrachloroethane	4.7E-05 J	4.7E-05 J	$\mu g/m^3$	IR49-SS07-11A	1/13	--	4.7E-05	N/A	4.2E-02 C	N/A	N/A	NO	BSL
	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-11	ND	ND	$\mu g/m^3$		0/13	--	1.3E+00	N/A	3.1E+03 N	N/A	N/A	NO	DLBSL
	79-00-5	1,1,2-Trichloroethane	ND	ND	$\mu g/m^3$		0/13	--	4.7E-02	N/A	2.1E-02 C**	N/A	N/A	YES	DLASL
	75-34-3	1,1-Dichloroethane	ND	ND	$\mu g/m^3$		0/13	--	1.6E-01	N/A	1.5E+00 C	N/A	N/A	NO	DLBSL
	75-35-4	1,1-Dichloroethene	ND	ND	$\mu g/m^3$		0/13	--	2.9E-01	N/A	2.1E+01 N	N/A	N/A	NO	DLBSL
	120-82-1	1,2,4-Trichlorobenzene	ND	ND	$\mu g/m^3$		0/13	--	2.2E-02	N/A	2.1E-01 N	N/A	N/A	NO	DLBSL
	96-12-8	1,2-Dibromo-3-chloropropane	ND	ND	$\mu g/m^3$		0/13	--	5.4E-02	N/A	1.6E-04 C	N/A	N/A	YES	DLASL
	106-93-4	1,2-Dibromoethane	ND	ND	$\mu g/m^3$		0/13	--	3.9E-02	N/A	4.1E-03 C	N/A	N/A	YES	DLASL
	95-50-1	1,2-Dichlorobenzene	ND	ND	$\mu g/m^3$		0/13	--	2.9E-02	N/A	2.1E+01 N	N/A	N/A	NO	DLBSL
	107-06-2	1,2-Dichloroethane	ND	ND	$\mu g/m^3$		0/13	--	7.3E-02	N/A	9.4E-02 C*	N/A	N/A	NO	DLBSL
	78-87-5	1,2-Dichloropropane	ND	ND	$\mu g/m^3$		0/13	--	8.9E-02	N/A	2.4E-01 C*	N/A	N/A	NO	DLBSL
	541-73-1	1,3-Dichlorobenzene	ND	ND	$\mu g/m^3$		0/13	--	3.2E-02	N/A	2.2E-01 C	N/A	N/A	NO	DLBSL
	106-46-7	1,4-Dichlorobenzene	ND	ND	$\mu g/m^3$		0/13	--	3.2E-02	N/A	2.2E-01 C	N/A	N/A	NO	DLBSL
	78-93-3	2-Butanone	4.9E-04 J	1.0E-03 J	$\mu g/m^3$	IR49-SS07-11A	2/12	--	1.0E-03	N/A	5.2E+02 N	N/A	N/A	NO	BSL
	591-78-6	2-Hexanone	ND	ND	$\mu g/m^3$		0/13	--	1.3E+00	N/A	3.1E+00 N	N/A	N/A	NO	DLBSL
	108-10-1	4-Methyl-2-pentanone	ND	ND	$\mu g/m^3$		0/13	--	1.6E+00	N/A	3.1E+02 N	N/A	N/A	NO	DLBSL
	67-64-1	Acetone	2.5E-03 J	1.3E-02 J	$\mu g/m^3$	IR49-SS07-11A	3/13	--	1.3E-02	N/A	3.2E+03 N	N/A	N/A	NO	BSL
	71-43-2	Benzene	4.4E-04 J	4.4E-04 J	$\mu g/m^3$	IR49-SS07-11A	1/13	--	4.4E-04	N/A	3.1E-01 C	N/A	N/A	NO	BSL
	75-27-4	Bromodichloromethane	ND	ND	$\mu g/m^3$		0/13	--	8.5E-02	N/A	6.6E-02 C	N/A	N/A	YES	DLASL
	75-25-2	Bromoform	ND	ND	$\mu g/m^3$		0/13	--	3.5E-02	N/A	2.2E+00 C	N/A	N/A	NO	DLBSL
	74-83-9	Bromomethane	ND	ND	$\mu g/m^3$		0/13	--	2.4E-01	N/A	5.2E-01 N	N/A	N/A	NO	DLBSL
	75-15-0	Carbon disulfide	4.8E-04 J	3.2E-02 J	$\mu g/m^3$	IR49-SS12-11A	7/13	--	3.2E-02	N/A	7.3E+01 N	N/A	N/A	NO	BSL
	56-23-5	Carbon tetrachloride	ND	ND	$\mu g/m^3$		0/13	--	2.2E-01	N/A	4.1E-01 C	N/A	N/A	NO	DLBSL
	108-90-7	Chlorobenzene	ND	ND	$\mu g/m^3$		0/13	--	5.2E-02	N/A	5.2E+00 N	N/A	N/A	NO	DLBSL
	75-00-3	Chloroethane	ND	ND	$\mu g/m^3$		0/13	--	2.6E-01	N/A	1.0E+03 N	N/A	N/A	NO	DLBSL
	67-66-3	Chloroform	ND	ND	$\mu g/m^3$		0/13	--	1.3E-01	N/A	1.1E-01 C	N/A	N/A	YES	DLASL
	74-87-3	Chloromethane	ND	ND	$\mu g/m^3$		0/13	--	2.9E-01	N/A	9.4E+00 N	N/A	N/A	NO	DLBSL
	156-59-2	cis-1,2-Dichloroethene	ND	ND	$\mu g/m^3$		0/13	--	1.3E-01	N/A	6.3E+00 N	N/A	N/A	NO	DLBSL
	10061-01-5	cis-1,3-Dichloropropene	ND	ND	$\mu g/m^3$		0/13	--	9.5E-02	N/A	6.1E-01 C*	N/A	N/A	NO	DLBSL
	110-82-7	Cyclohexane	7.7E-04 J	7.7E-04 J	$\mu g/m^3$	IR49-SS07-11A	1/13	--	7.7E-04	N/A	6.3E+02 N	N/A	N/A	NO	BSL

Appendix F

TABLE 2.2

Occurrence, Distribution And Selection of Chemicals of Potential Concern

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Air

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
	124-48-1	Dibromochloromethane	ND	ND	µg/m³		0/13	--	4.2E-02	N/A	9.0E-02 C	N/A	N/A	NO	DLBSL
	75-71-8	Dichlorodifluoromethane (Freon-12)	ND	ND	µg/m³		0/13	--	4.0E-01	N/A	1.0E+01 N	N/A	N/A	NO	DLBSL
	100-41-4	Ethylbenzene	3.9E-04 J	3.9E-04 J	µg/m³	IR49-SS07-11A	1/13	--	3.9E-04	N/A	9.7E-01 C	N/A	N/A	NO	BSL
	98-82-8	Isopropylbenzene	ND	ND	µg/m³		0/13	--	5.4E-02	N/A	4.2E+01 N	N/A	N/A	NO	DLBSL
	79-20-9	Methyl acetate	2.1E-04 J	5.0E-01 J	µg/m³	IR49-SS12-11A	10/13	--	5.0E-01	N/A	N/A	N/A	N/A	NO	NTX
	108-87-2	Methylcyclohexane	2.1E-03 J	2.1E-03 J	µg/m³	IR49-SS07-11A	1/13	--	2.1E-03	N/A	7.3E+01 N	N/A	N/A	NO	BSL
	75-09-2	Methylene chloride	1.0E-02 J	3.4E-02 J	µg/m³	IR49-SS12D-11B	2/13	--	3.4E-02	N/A	5.2E+00 C	N/A	N/A	NO	BSL
	1634-04-4	Methyl-tert-butyl ether (MTBE)	ND	ND	µg/m³		0/13	--	6.9E-02	N/A	9.4E+00 C	N/A	N/A	NO	DLBSL
	100-42-5	Styrene	ND	ND	µg/m³		0/13	--	3.6E-02	N/A	1.0E+02 N	N/A	N/A	NO	DLBSL
	127-18-4	Tetrachloroethene	ND	ND	µg/m³		0/13	--	1.4E-01	N/A	4.1E-01 C	N/A	N/A	NO	DLBSL
	108-88-3	Toluene	1.9E-04 J	5.7E-04 J	µg/m³	IR49-SS07-11A	2/13	--	5.7E-04	N/A	5.2E+02 N	N/A	N/A	NO	BSL
	156-60-5	trans-1,2-Dichloroethene	ND	ND	µg/m³		0/13	--	1.3E-01	N/A	6.3E+00 N	N/A	N/A	NO	DLBSL
	10061-02-6	trans-1,3-Dichloropropene	ND	ND	µg/m³		0/13	--	9.5E-02	N/A	6.1E-01 C*	N/A	N/A	NO	DLBSL
	79-01-6	Trichloroethene	4.8E-04 J	1.7E-03 J	µg/m³	IR49-SS07-11A	2/13	--	1.7E-03	N/A	1.0E+00 C**	N/A	N/A	NO	BSL
	75-69-4	Trichlorofluoromethane (Freon-11)	3.1E-02 J	3.1E-02 J	µg/m³	IR49-SS03-11A	1/13	--	3.1E-02	N/A	7.3E+01 N	N/A	N/A	NO	BSL
	75-01-4	Vinyl chloride	ND	ND	µg/m³		0/13	--	3.5E-01	N/A	1.6E-01 C	N/A	N/A	YES	DLASL
	1330-20-7	Xylene, total	ND	ND	µg/m³		0/13	--	2.5E-02	N/A	1.0E+01 N	N/A	N/A	NO	DLBSL

[1] Minimum/Maximum calculated air concentrations from surface soil concentrations. Air concentrations calculated as $C_{air} = C_{soil}*1000*(1/PEF + 1/VF)$.
PEF = 1.36E+09 m³/kg. VF calculated for volatile constituents only, on Table 2.2A. PEF and VF from USEPA's Soil Screening Guidance. (USEPA, July 1996)

[2] Maximum concentration is used for screening. If not detected, maximum detection limit used for screening.

[3] Background values not available.

[4] USEPA, June 2011. Regional Screening Levels for Chemical Contaminants at Superfund Sites. Adjusted Residential Ambient Air RSL. RSLs based on non-cancer (N) divided by 1
Available: http://epa-prgs.ornl.gov/chemicals/index.shtml
RSL value for Methyl Isobutyl Ketone (4-methyl-2-pentanone) used as surrogate for 2-Hexanone.
RSL value for 1,4-dichlorobenzene used as a surrogate for 1,3-dichlorobenzene.
RSL value for 1,3-dichloropropene used as a surrogate for cis-1,3-dichloropropene and trans-1,3-dichloropropene.
RSL for n-hexane used as surrogate for methylcyclohexane.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)
Detection Limit Above Screening Level (DLASL), not quantitatively evaluated in HHRA

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
C = Carcinogenic
C* = N screening level < 100x C screening level, therefore C screening value used
C** = N screening level < 10x C screening level, therefore N screening value/10 used as screening level
N = Noncarcinogenic
N/A = Not applicable/not available

Appendix F
TABLE 2.2A
Calculation of Volatilization Factor
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Chemical	CAS Number	Diffusivity in Air (D_i) (cm^2/s)	Henry's Law Constant (H') (unitless)	Diffusivity in Water (D_w) (cm^2/s)	Soil Organic Carbon Partition Coeff. (K_{oc}) (cm^3/g)	Soil Water Partition Coeff. ($K_d = K_{oc} \times F_{oc}$) ($g/cm^3$)	Solubility in Water (S) (mg/L)	Apparent Diffusivity (D_A) (cm^2/s)	Volatilization Factor (VF) (m^3/kg)	Soil Saturation Concentration (C_{sat}) (mg/kg)
1,1,1-Trichloroethane	71-55-6	6.48E-02	7.03E-01	9.60E-06	4.39E+01	2.63E-01	1.29E+03	4.89E-03	2.01E+03	6.40E+02
1,1,2,2-Tetrachloroethane	79-34-5	4.89E-02	1.50E-02	9.29E-06	9.49E+01	5.70E-01	2.83E+03	5.82E-05	1.84E+04	1.90E+03
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	76-13-1	3.76E-02	2.15E+01	8.59E-06	1.97E+02	1.18E+00	1.70E+02	8.04E-03	1.57E+03	9.10E+02
1,1,2-Trichloroethane	79-00-5	6.69E-02	3.37E-02	1.00E-05	6.07E+01	3.64E-01	4.59E+03	2.55E-04	8.80E+03	2.16E+03
1,1-Dichloroethane	75-34-3	8.36E-02	2.30E-01	1.06E-05	3.18E+01	1.91E-01	5.04E+03	3.06E-03	2.54E+03	1.69E+03
1,1-Dichloroethene	75-35-4	8.63E-02	1.07E+00	1.10E-05	3.18E+01	1.91E-01	2.42E+03	9.95E-03	1.41E+03	1.19E+03
1,2,4-Trichlorobenzene	120-82-1	3.96E-02	5.81E-02	8.40E-06	1.36E+03	8.14E+00	4.90E+01	1.49E-05	3.65E+04	4.04E+02
1,2-Dibromo-3-chloropropane	96-12-8	3.21E-02	6.01E-03	8.90E-06	1.16E+02	6.95E-01	1.23E+03	1.30E-05	3.90E+04	9.79E+02
1,2-Dibromoethane	106-93-4	4.30E-02	2.66E-02	1.04E-05	3.96E+01	2.38E-01	3.91E+03	1.78E-04	1.05E+04	1.34E+03
1,2-Dichlorobenzene	95-50-1	5.62E-02	7.85E-02	8.92E-06	3.83E+02	2.30E+00	1.56E+02	9.74E-05	1.43E+04	3.76E+02
1,2-Dichloroethane	107-06-2	8.57E-02	4.82E-02	1.10E-05	3.96E+01	2.38E-01	8.60E+03	6.36E-04	5.58E+03	2.98E+03
1,2-Dichloropropane	78-87-5	7.33E-02	1.15E-01	9.73E-06	6.07E+01	3.64E-01	2.80E+03	9.27E-04	4.62E+03	1.36E+03
1,3-Dichlorobenzene[1]	106-46-7	5.50E-02	9.85E-02	8.68E-06	3.75E+02	2.25E+00	8.13E+01	1.22E-04	1.27E+04	1.93E+02
1,4-Dichlorobenzene	106-46-7	5.50E-02	9.85E-02	8.68E-06	3.75E+02	2.25E+00	8.13E+01	1.22E-04	1.27E+04	1.93E+02
2-Butanone	78-93-3	9.14E-02	2.33E-03	1.02E-05	4.51E+00	2.71E-02	2.23E+05	8.94E-05	1.49E+04	2.84E+04
2-Hexanone	591-78-6	7.04E-02	3.81E-03	8.44E-06	1.50E+01	8.99E-02	1.72E+04	7.52E-05	1.62E+04	3.28E+03
4-Methyl-2-pentanone	108-10-1	6.98E-02	5.64E-03	8.35E-06	1.26E+01	7.56E-02	1.90E+04	1.19E-04	1.29E+04	3.36E+03
Acetone	67-64-1	1.06E-01	1.43E-03	1.15E-05	2.36E+00	1.42E-02	1.00E+06	7.12E-05	1.67E+04	1.14E+05
Benzene	71-43-2	8.95E-02	2.27E-01	1.03E-05	1.46E+02	8.75E-01	1.79E+03	1.06E-03	4.31E+03	1.82E+03
Bromodichloromethane	75-27-4	5.63E-02	8.67E-02	1.07E-05	3.18E+01	1.91E-01	3.03E+03	8.46E-04	4.84E+03	9.31E+02
Bromoform	75-25-2	3.57E-02	2.19E-02	1.04E-05	3.18E+01	1.91E-01	3.10E+03	1.41E-04	1.18E+04	9.15E+02
Bromomethane	74-83-9	1.00E-01	3.00E-01	1.35E-05	1.32E+01	7.93E-02	1.52E+04	6.80E-03	1.71E+03	3.59E+03
Carbon Disulfide	75-15-0	1.06E-01	5.89E-01	1.30E-05	2.17E+01	1.30E-01	2.16E+03	9.77E-03	1.42E+03	7.38E+02
Carbon Tetrachloride	56-23-5	5.71E-02	1.13E+00	9.78E-06	4.39E+01	2.63E-01	7.93E+02	5.95E-03	1.82E+03	4.58E+02
Chlorobenzene	108-90-7	7.21E-02	1.27E-01	9.48E-06	2.34E+02	1.40E+00	4.98E+02	3.20E-04	7.86E+03	7.61E+02
Chloroethane	75-00-3	1.04E-01	4.54E-01	1.16E-05	2.17E+01	1.30E-01	6.71E+03	7.93E-03	1.58E+03	2.12E+03
Chloroform	67-66-3	7.69E-02	1.50E-01	1.09E-05	3.18E+01	1.91E-01	7.95E+03	1.93E-03	3.21E+03	2.54E+03
Chloromethane	74-87-3	1.24E-01	3.61E-01	1.36E-05	1.32E+01	7.93E-02	5.32E+03	9.62E-03	1.43E+03	1.32E+03
cis-1,2-Dichloroethene	156-59-2	8.84E-02	1.67E-01	1.13E-05	3.96E+01	2.38E-01	6.41E+03	2.13E-03	3.05E+03	2.37E+03
cis-1,3-Dichloropropene	542-75-6	7.63E-02	1.45E-01	1.01E-05	7.22E+01	4.33E-01	2.80E+03	1.05E-03	4.34E+03	1.57E+03
Cyclohexane	110-82-7	8.00E-02	6.13E+00	9.11E-06	1.46E+02	8.75E-01	5.50E+01	1.22E-02	1.27E+03	1.17E+02
Dibromochloromethane	124-48-1	3.66E-02	3.20E-02	1.06E-05	3.18E+01	1.91E-01	2.70E+03	2.11E-04	9.69E+03	8.02E+02
Dichlorodifluoromethane (Freon-12)	75-71-8	7.60E-02	1.40E+01	1.08E-05	4.39E+01	2.63E-01	2.80E+02	1.88E-02	1.03E+03	8.45E+02
Ethylbenzene	100-41-4	6.85E-02	3.22E-01	8.46E-06	4.46E+02	2.68E+00	1.69E+02	4.14E-04	6.91E+03	4.80E+02
Isopropylbenzene	98-82-8	6.03E-02	4.70E-01	7.86E-06	6.98E+02	4.19E+00	6.13E+01	3.45E-04	7.57E+03	2.68E+02
Methyl Acetate	79-20-9	9.58E-02	4.70E-03	1.10E-05	3.06E+00	1.84E-02	2.43E+05	2.02E-04	9.90E+03	2.90E+04
Methylcyclohexane*	108-87-2	6.97E-02	1.59E+01	7.59E-06	7.85E+01	4.71E-01	1.04E+01	6.97E-02	5.33E+02	3.73E+01
Methylene chloride	75-09-2	9.99E-02	1.33E-01	1.25E-05	2.17E+01	1.30E-01	1.30E+04	2.77E-03	2.67E+03	3.32E+03
Methyl-tert-butyl Ether (MTBE)	1634-04-4	7.53E-02	2.40E-02	8.59E-06	1.16E+01	6.94E-02	5.10E+04	5.54E-04	5.98E+03	8.87E+03
Styrene	100-42-5	7.11E-02	1.12E-01	8.78E-06	4.46E+02	2.68E+00	3.10E+02	1.52E-04	1.14E+04	8.67E+02
Tetrachloroethene	127-18-4	5.05E-02	7.24E-01	9.46E-06	9.49E+01	5.70E-01	2.06E+02	2.41E-03	2.86E+03	1.66E+02
Toluene	108-88-3	7.78E-02	2.71E-01	9.20E-06	2.34E+02	1.40E+00	5.26E+02	7.24E-04	5.23E+03	8.18E+02
trans-1,2-Dichloroethene	156-60-5	8.76E-02	1.67E-01	1.12E-05	3.96E+01	2.38E-01	4.52E+03	2.11E-03	3.06E+03	1.67E+03
trans-1,3-Dichloropropene	542-75-6	7.63E-02	1.45E-01	1.01E-05	7.22E+01	4.33E-01	2.80E+03	1.05E-03	4.34E+03	1.57E+03

Appendix F
TABLE 2.2A
Calculation of Volatilization Factor
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Chemical	CAS Number	Diffusivity in Air (D_i) (cm^2/s)	Henry's Law Constant (H') (unitless)	Diffusivity in Water (D_w) (cm^2/s)	Soil Organic Carbon Partition Coeff. (K_{oc}) (cm^3/g)	Soil Water Partition Coeff. ($K_d = K_{oc} \times F_{oc}$) ($g/cm^3$)	Solubility in Water (S) (mg/L)	Apparent Diffusivity (D_A) (cm^2/s)	Volatilization Factor (VF) (m^3/kg)	Soil Saturation Concentration (C_{sat}) (mg/kg)
Trichloroethene	79-01-6	6.87E-02	4.03E-01	1.02E-05	6.07E+01	3.64E-01	1.28E+03	2.73E-03	2.69E+03	6.92E+02
Trichlorofluoromethane (Freon-11)	75-69-4	6.54E-02	3.97E+00	1.00E-05	4.39E+01	2.63E-01	1.10E+03	1.24E-02	1.26E+03	1.23E+03
Vinyl Chloride	75-01-4	1.07E-01	1.14E+00	1.20E-05	2.17E+01	1.30E-01	8.80E+03	1.46E-02	1.17E+03	3.92E+03
Xylene, Total	1330-20-7	8.47E-02	2.12E-01	9.90E-06	3.83E+02	1.09E+02	1.06E+02	8.78E-06	4.75E+04	1.15E+04
1,1-Biphenyl	92-52-4	4.71E-02	1.26E-02	7.56E-06	5.13E+03	3.08E+01	6.94E+00	1.02E-06	1.39E+05	2.14E+02
2,2'-Oxybis(1-chloropropane)	108-60-1	3.99E-02	3.03E-03	7.36E-06	8.29E+01	4.98E-01	1.70E+03	1.09E-05	4.27E+04	1.02E+03
2-Chloronaphthalene	91-58-7	4.47E-02	1.31E-02	7.73E-06	2.48E+03	1.49E+01	1.17E+01	2.08E-06	9.74E+04	1.75E+02
2-Chlorophenol	95-57-8	6.61E-02	4.58E-04	9.48E-06	3.07E+02	1.84E+00	1.13E+04	8.63E-07	1.51E+05	2.19E+04
2-Methylnaphthalene	91-57-6	5.24E-02	2.12E-02	7.78E-06	2.48E+03	1.49E+01	2.46E+01	3.95E-06	7.07E+04	3.68E+02
Acenaphthene	83-32-9	5.06E-02	7.52E-03	8.33E-06	5.03E+03	3.02E+01	3.90E+00	6.72E-07	1.72E+05	1.18E+02
Acetophenone	98-86-2	6.52E-02	4.25E-04	8.72E-06	5.19E+01	3.11E-01	6.13E+03	3.73E-06	7.28E+04	2.52E+03
Anthracene	120-12-7	3.90E-02	2.27E-03	7.85E-06	1.64E+04	9.82E+01	4.34E-02	4.85E-08	6.38E+05	4.26E+00
Benzaldehyde	100-52-7	7.44E-02	1.09E-03	9.46E-06	1.11E+01	6.65E-02	6.95E+03	2.63E-05	2.74E+04	1.16E+03
bis(2-Chloroethyl)ether	111-44-4	5.67E-02	6.95E-04	8.71E-06	3.22E+01	1.93E-01	1.72E+04	7.35E-06	5.19E+04	5.05E+03
Dibenzofuran	132-64-9	4.10E-02	8.71E-03	7.38E-06	9.16E+03	5.50E+01	3.10E+00	3.47E-07	2.39E+05	1.71E+02
Fluorene	86-73-7	4.40E-02	3.93E-03	7.89E-06	9.16E+03	5.50E+01	1.69E+00	1.68E-07	3.43E+05	9.31E+01
Naphthalene	91-20-3	6.05E-02	1.80E-02	8.38E-06	1.54E+03	9.26E+00	3.10E+01	6.20E-06	5.65E+04	2.90E+02
Nitrobenzene	98-95-3	6.81E-02	9.81E-04	9.45E-06	2.26E+02	1.36E+00	2.09E+03	2.48E-06	8.93E+04	3.05E+03
Pyrene	129-00-0	2.78E-02	4.87E-04	7.25E-06	5.43E+04	3.26E+02	1.35E-01	2.35E-09	2.90E+06	4.40E+01

(m^3/kg) $2 * r_b * D_A$

Apparent Diffusivity (D_A) = (cm^2/s)

$$\frac{[(Q_a^{10/3} * D_i * H' + Q_w^{10/3} * D_w)/n^2]}{(r_b * K_d + Q_w + Q_a * H')}$$

Soil Saturation Concentration (C_{sat}) =

$$S/r_b * (K_d * r_b + Q_w + H' * Q_a)$$

Parameters	Values
Q/C - Inverse of the mean concentration at the center of a 0.5-acre-square source located in Raleigh-Durham, NC (g/m^2-s per kg/m^3)	77.26
T - Exposure interval(s)	9.5E+08
r_b - Soil bulk density (g/cm^3)	1.5
Q_a - Air-filled soil porosity (L_{air}/L_{water}) = n - Q_w	0.28
n - Total soil porosity (Lpore/Lsoil) = 1 - (r_b/r_s)	0.43
Q_w - Water-filled soil porosity (Lwater/Lsoil)	0.15
r_s - Soil particle density (g/cm^3)	2.65
f_{oc} - fraction organic carbon in soil (g/g)	0.006

Equations from USEPA, 1996. *Soil Screening Guidance: User's Guide.* EPA/540/R-96/018.

Physical/chemical properties from Oak Ridge National Laboratory (ORNL). May 2011. Regional Screening Levels for Chemical Contaminants at Superfund Sites.

1. Values for 1,4-dichlorobenzene used.

* Physical/chemical properties from Commission on Environmental Quality (http://www.tceq.state.tx.us/remediation/trrp/trrppcls.html), and Risk Assessment Information System (http://rais.ornl.gov/)

Appendix F

TABLE 2.3

Occurrence, Distribution And Selection of Chemicals of Potential Concern

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe:Current/ Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Drainage Ditches	71-55-6	1,1,1-Trichloroethane	ND	ND	UG/L		0/2	1 - 1	1.0E+00	ND	2.0E+02 A			NO	DLBSL
	79-34-5	1,1,2,2-Tetrachloroethane	ND	ND	UG/L		0/2	1 - 1	1.0E+00	ND	1.7E-01 N			YES	DLASL
	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	ND	ND	UG/L		0/2	1 - 1	1.0E+00	ND	5.9E+03 R-n			NO	DLBSL
	79-00-5	1,1,2-Trichloroethane	ND	ND	UG/L		0/2	1 - 1	1.0E+00	ND	5.9E-01 A			YES	DLASL
	75-34-3	1,1-Dichloroethane	ND	ND	UG/L		0/2	1 - 1	1.0E+00	ND	2.4E+00 R-c			NO	DLBSL
	75-35-4	1,1-Dichloroethene	ND	ND	UG/L		0/2	1 - 1	1.0E+00	ND	3.3E+02 A			NO	DLBSL
	120-82-1	1,2,4-Trichlorobenzene	ND	ND	UG/L		0/2	2 - 2	2.0E+00	ND	3.5E+01 A			NO	DLBSL
	96-12-8	1,2-Dibromo-3-chloropropane	ND	ND	UG/L		0/2	2 - 2	2.0E+00	ND	3.2E-04 R-c			YES	DLASL
	106-93-4	1,2-Dibromoethane	ND	ND	UG/L		0/2	1 - 1	1.0E+00	ND	6.5E-03 R-c			YES	DLASL
	95-50-1	1,2-Dichlorobenzene	ND	ND	UG/L		0/2	1 - 1	1.0E+00	ND	4.2E+02 A			NO	DLBSL
	107-06-2	1,2-Dichloroethane	ND	ND	UG/L		0/2	1 - 1	1.0E+00	ND	3.8E-01 A			YES	DLASL
	78-87-5	1,2-Dichloropropane	ND	ND	UG/L		0/2	1 - 1	1.0E+00	ND	5.0E-01 A			YES	DLASL
	541-73-1	1,3-Dichlorobenzene	ND	ND	UG/L		0/2	1 - 1	1.0E+00	ND	3.2E+02 A			NO	DLBSL
	106-46-7	1,4-Dichlorobenzene	ND	ND	UG/L		0/2	1 - 1	1.0E+00	ND	6.3E+01 A			NO	DLBSL
	78-93-3	2-Butanone	ND	ND	UG/L		0/2	5 - 5	5.0E+00	ND	7.1E+02 R-n			NO	DLBSL
	591-78-6	2-Hexanone	ND	ND	UG/L		0/2	5 - 5	5.0E+00	ND	4.7E+00 R-n			YES	DLASL
	108-10-1	4-Methyl-2-pentanone	ND	ND	UG/L		0/2	5 - 5	5.0E+00	ND	2.0E+02 R-n			NO	DLBSL
	67-64-1	Acetone	ND	ND	UG/L		0/2	10 - 10	1.0E+01	ND	2.2E+03 R-n			NO	DLBSL
	71-43-2	Benzene	ND	ND	UG/L		0/2	1 - 1	1.0E+00	ND	2.2E+00 A			NO	DLBSL
	75-27-4	Bromodichloromethane	ND	ND	UG/L		0/2	1 - 1	1.0E+00	1.0E+00	5.5E-01 A			YES	DLASL
	75-25-2	Bromoform	ND	ND	UG/L		0/2	1 - 1	1.0E+00	ND	4.3E+00 A			NO	DLBSL
	74-83-9	Bromomethane	ND	ND	UG/L		0/2	1 - 1	1.0E+00	ND	4.7E+01 A			NO	DLBSL
	75-15-0	Carbon disulfide	ND	ND	UG/L		0/2	5 - 5	5.0E+00	ND	1.0E+02 R-n			NO	DLBSL
	56-23-5	Carbon tetrachloride	ND	ND	UG/L		0/2	1 - 1	1.0E+00	ND	2.3E-01 A	2.5E-01	N	YES	DLASL
	108-90-7	Chlorobenzene	ND	ND	UG/L		0/2	1 - 1	1.0E+00	ND	1.3E+02 A			NO	DLBSL
	75-00-3	Chloroethane	ND	ND	UG/L		0/2	1 - 1	1.0E+00	ND	2.1E+03 R-n			NO	DLBSL
	67-66-3	Chloroform	ND	ND	UG/L		0/2	1 - 1	1.0E+00	1.7E+00	5.7E+00 A			NO	DLBSL
	74-87-3	Chloromethane	ND	ND	UG/L		0/2	1 - 1	1.0E+00	ND	1.9E+01 R-n			NO	DLBSL
	156-59-2	cis-1,2-Dichloroethene	ND	ND	UG/L		0/2	1 - 1	1.0E+00	ND	3.7E+01 R-n			NO	DLBSL
	10061-01-5	cis-1,3-Dichloropropene	ND	ND	UG/L		0/2	1 - 1	1.0E+00	ND	3.4E-01 A			YES	DLASL
	110-82-7	Cyclohexane	ND	ND	UG/L		0/2	5 - 5	5.0E+00	ND	1.3E+03 R-n			NO	DLBSL
	124-48-1	Dibromochloromethane	ND	ND	UG/L		0/2	1 - 1	1.0E+00	4.0E+00	4.0E-01 A			YES	DLASL

Appendix F

TABLE 2.3

Occurrence, Distribution And Selection of Chemicals of Potential Concern

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe:Current/ Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
	75-71-8	Dichlorodifluoromethane (Freon-12)	ND	ND	UG/L		0/2	1 - 1	1.0E+00	ND	3.9E+01 R-n			NO	DLBSL
	100-41-4	Ethylbenzene	ND	ND	UG/L		0/2	1 - 1	1.0E+00	ND	5.3E+02 A			NO	DLBSL
	98-82-8	Isopropylbenzene	ND	ND	UG/L		0/2	1 - 1	1.0E+00	ND	6.8E+01 R-n			NO	DLBSL
	79-20-9	Methyl acetate	ND	ND	UG/L		0/2	5 - 5	5.0E+00	ND	3.7E+03 R-n			NO	DLBSL
	108-87-2	Methylcyclohexane	ND	ND	UG/L		0/2	5 - 5	5.0E+00	ND	8.8E+01 R-n			NO	DLBSL
	75-09-2	Methylene chloride	ND	ND	UG/L		0/2	1 - 1	1.0E+00	ND	4.6E+00 A			NO	DLBSL
	1634-04-4	Methyl-tert-butyl ether (MTBE)	ND	ND	UG/L		0/2	1 - 1	1.0E+00	ND	1.2E+01 R-c			NO	DLBSL
	100-42-5	Styrene	ND	ND	UG/L		0/2	1 - 1	1.0E+00	ND	1.6E+02 R-n			NO	DLBSL
	127-18-4	Tetrachloroethene	ND	ND	UG/L		0/2	1 - 1	1.0E+00	ND	6.9E-01 A	7.0E-01	N	YES	DLASL
	108-88-3	Toluene	ND	ND	UG/L		0/2	1 - 1	1.0E+00	ND	1.3E+03 A			NO	DLBSL
	156-60-5	trans-1,2-Dichloroethene	ND	ND	UG/L		0/2	1 - 1	1.0E+00	ND	1.0E+02 N			NO	DLBSL
	10061-02-6	trans-1,3-Dichloropropene	ND	ND	UG/L		0/2	1 - 1	1.0E+00	ND	3.4E-01 A			YES	DLASL
	79-01-6	Trichloroethene	ND	ND	UG/L		0/2	1 - 1	1.0E+00	ND	2.5E+00 A	2.5E+00	N	NO	DLBSL
	75-69-4	Trichlorofluoromethane (Freon-11)	ND	ND	UG/L		0/2	1 - 1	1.0E+00	ND	1.3E+02 R-n			NO	DLBSL
	75-01-4	Vinyl chloride	ND	ND	UG/L		0/2	1 - 1	1.0E+00	ND	2.5E-02 A	2.5E-02	N	YES	DLASL
	1330-20-7	Xylene, total	ND	ND	UG/L		0/2	3 - 3	3.0E+00	ND	2.0E+01 N			NO	DLBSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening. If not detected, maximum detection limit used for screening.

[3] Background values from sample IR49-SW01-11A.

[4] North Carolina WQS for Human Health and Water Supply, Federal Ambient Water Quality Criteria, Consumption of Water and Organisms, or USEPA Regional Screening Levels for Tap Water.
RSL for n-hexane used as surrogate for methylcyclohexane.
RSL value for 1,3-dichloropropene used as a surrogate for cis-1,3-dichloropropene and trans-1,3-dichloropropene.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)
Detection Limit Above Screening Level (DLASL), not quantitatively evaluated in HHRA

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)
Detection Limit Below Screening Level (DLBSL)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
N = North Carolina 15A NCAC 2B Human Health, Amended Feb. 2010.
A= Federal Ambient Water Quality Criteria, Consumption of Water and Organisms
R-n = USEPA Regional Screening Level, noncarcinogenic (therefore, RSL divided by 10, see text)
R-c = USEPA Regional Screening Level, Carcinogenic
N/A = Not available
ND = not detected

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TABLE 2.4

Occurrence, Distribution And Selection of Chemicals of Potential Concern

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe:Current/Future
Medium: Pore Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
New River	71-55-6	1,1,1-Trichloroethane	ND	ND	UG/L		0/2	1 - 1	1.0E+00	N/A	2.0E+02 A			NO	DLBSL
	79-34-5	1,1,2,2-Tetrachloroethane	ND	ND	UG/L		0/2	1 - 1	1.0E+00	N/A	1.7E-01 N			YES	DLASL
	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	ND	ND	UG/L		0/2	1 - 1	1.0E+00	N/A	5.9E+03 R-n			NO	DLBSL
	79-00-5	1,1,2-Trichloroethane	ND	ND	UG/L		0/2	1 - 1	1.0E+00	N/A	5.9E-01 A			YES	DLASL
	75-34-3	1,1-Dichloroethane	ND	ND	UG/L		0/2	1 - 1	1.0E+00	N/A	2.4E+00 R-c			NO	DLBSL
	75-35-4	1,1-Dichloroethene	ND	ND	UG/L		0/2	1 - 1	1.0E+00	N/A	3.3E+02 A			NO	DLBSL
	120-82-1	1,2,4-Trichlorobenzene	ND	ND	UG/L		0/2	2 - 2	2.0E+00	N/A	3.5E+01 A			NO	DLBSL
	96-12-8	1,2-Dibromo-3-chloropropane	ND	ND	UG/L		0/2	2 - 2	2.0E+00	N/A	3.2E-04 R-c			YES	DLASL
	106-93-4	1,2-Dibromoethane	ND	ND	UG/L		0/2	1 - 1	1.0E+00	N/A	6.5E-03 R-c			YES	DLASL
	95-50-1	1,2-Dichlorobenzene	ND	ND	UG/L		0/2	1 - 1	1.0E+00	N/A	4.2E+02 A			NO	DLBSL
	107-06-2	1,2-Dichloroethane	ND	ND	UG/L		0/2	1 - 1	1.0E+00	N/A	3.8E-01 A			YES	DLASL
	78-87-5	1,2-Dichloropropane	ND	ND	UG/L		0/2	1 - 1	1.0E+00	N/A	5.0E-01 A			YES	DLASL
	541-73-1	1,3-Dichlorobenzene	ND	ND	UG/L		0/2	1 - 1	1.0E+00	N/A	3.2E+02 A			NO	DLBSL
	106-46-7	1,4-Dichlorobenzene	ND	ND	UG/L		0/2	1 - 1	1.0E+00	N/A	6.3E+01 A			NO	DLBSL
	78-93-3	2-Butanone	ND	ND	UG/L		0/2	5 - 5	5.0E+00	N/A	7.1E+02 R-n			NO	DLBSL
	591-78-6	2-Hexanone	ND	ND	UG/L		0/2	5 - 5	5.0E+00	N/A	4.7E+00 R-n			YES	DLASL
	108-10-1	4-Methyl-2-pentanone	ND	ND	UG/L		0/2	5 - 5	5.0E+00	N/A	2.0E+02 R-n			NO	DLBSL
	67-64-1	Acetone	ND	ND	UG/L		0/2	10 - 10	1.0E+01	N/A	2.2E+03 R-n			NO	DLBSL
	71-43-2	Benzene	ND	ND	UG/L		0/2	1 - 1	1.0E+00	N/A	2.2E+00 A			NO	DLBSL
	75-27-4	Bromodichloromethane	ND	ND	UG/L		0/2	1 - 1	1.0E+00	N/A	5.5E-01 A			YES	DLASL
	75-25-2	Bromoform	ND	ND	UG/L		0/2	1 - 1	1.0E+00	N/A	4.3E+00 A			NO	DLBSL
	74-83-9	Bromomethane	ND	ND	UG/L		0/2	1 - 1	1.0E+00	N/A	4.7E+01 A			NO	DLBSL
	75-15-0	Carbon disulfide	ND	ND	UG/L		0/2	5 - 5	5.0E+00	N/A	1.0E+02 R-n			NO	DLBSL
	56-23-5	Carbon tetrachloride	ND	ND	UG/L		0/2	1 - 1	1.0E+00	N/A	2.3E-01 A	2.5E-01	N	YES	DLASL
	108-90-7	Chlorobenzene	ND	ND	UG/L		0/2	1 - 1	1.0E+00	N/A	1.3E+02 A			NO	DLBSL
	75-00-3	Chloroethane	ND	ND	UG/L		0/2	1 - 1	1.0E+00	N/A	2.1E+03 R-n			NO	DLBSL
	67-66-3	Chloroform	ND	ND	UG/L		0/2	1 - 1	1.0E+00	N/A	5.7E+00 A			NO	DLBSL
	74-87-3	Chloromethane	ND	ND	UG/L		0/2	1 - 1	1.0E+00	N/A	1.9E+01 R-n			NO	DLBSL
	156-59-2	cis-1,2-Dichloroethene	ND	ND	UG/L		0/2	1 - 1	1.0E+00	N/A	3.7E+01 R-n			NO	DLBSL
	10061-01-5	cis-1,3-Dichloropropene	ND	ND	UG/L		0/2	1 - 1	1.0E+00	N/A	3.4E-01 A			YES	DLASL
	110-82-7	Cyclohexane	ND	ND	UG/L		0/2	5 - 5	5.0E+00	N/A	1.3E+03 R-n			NO	DLBSL
	124-48-1	Dibromochloromethane	ND	ND	UG/L		0/2	1 - 1	1.0E+00	N/A	4.0E-01 A			YES	DLASL
	75-71-8	Dichlorodifluoromethane (Freon-12)	ND	ND	UG/L		0/2	1 - 1	1.0E+00	N/A	3.9E+01 R-n			NO	DLBSL

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TABLE 2.4

Occurrence, Distribution And Selection of Chemicals of Potential Concern

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe:Current/Future
Medium: Pore Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
	100-41-4	Ethylbenzene	ND	ND	UG/L		0/2	1 - 1	1.0E+00	N/A	5.3E+02 A			NO	DLBSL
	98-82-8	Isopropylbenzene	ND	ND	UG/L		0/2	1 - 1	1.0E+00	N/A	6.8E+01 R-n			NO	DLBSL
	79-20-9	Methyl acetate	ND	ND	UG/L		0/2	5 - 5	5.0E+00	N/A	3.7E+03 R-n			NO	DLBSL
	108-87-2	Methylcyclohexane	ND	ND	UG/L		0/2	5 - 5	5.0E+00	N/A	8.8E+01 R-n			NO	DLBSL
	75-09-2	Methylene chloride	ND	ND	UG/L		0/2	1 - 1	1.0E+00	N/A	4.6E+00 A			NO	DLBSL
	1634-04-4	Methyl-tert-butyl ether (MTBE)	ND	ND	UG/L		0/2	1 - 1	1.0E+00	N/A	1.2E+01 R-c			NO	DLBSL
	100-42-5	Styrene	ND	ND	UG/L		0/2	1 - 1	1.0E+00	N/A	1.6E+02 R-n			NO	DLBSL
	127-18-4	Tetrachloroethene	ND	ND	UG/L		0/2	1 - 1	1.0E+00	N/A	6.9E-01 A	7.0E-01	N	YES	DLASL
	108-88-3	Toluene	ND	ND	UG/L		0/2	1 - 1	1.0E+00	N/A	1.3E+03 A			NO	DLBSL
	156-60-5	trans-1,2-Dichloroethene	ND	ND	UG/L		0/2	1 - 1	1.0E+00	N/A	1.0E+02 N			NO	DLBSL
	10061-02-6	trans-1,3-Dichloropropene	ND	ND	UG/L		0/2	1 - 1	1.0E+00	N/A	3.4E-01 A			YES	DLASL
	79-01-6	Trichloroethene	ND	ND	UG/L		0/2	1 - 1	1.0E+00	N/A	2.5E+00 A	2.5E+00	N	NO	DLBSL
	75-69-4	Trichlorofluoromethane (Freon-11)	ND	ND	UG/L		0/2	1 - 1	1.0E+00	N/A	1.3E+02 R-n			NO	DLBSL
	75-01-4	Vinyl chloride	ND	ND	UG/L		0/2	1 - 1	1.0E+00	N/A	2.5E-02 A	2.5E-02	N	YES	DLASL
	1330-20-7	Xylene, total	ND	ND	UG/L		0/2	3 - 3	3.0E+00	N/A	2.0E+01 N			NO	DLBSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening. If not detected, maximum detection limit used for screening.

[3] Background values not available.

[4] North Carolina WQS for Human Health and Water Supply, Federal Ambient Water Quality Criteria, Consumption of Water and Organisms, or USEPA Regional Screening Levels for Tap Water.
RSL for n-hexane used as surrogate for methylcyclohexane.
RSL value for Methyl Isobutyl Ketone (4-methyl-2-pentanone) used as surrogate for 2-Hexanone.
RSL value for 1,3-dichloropropene used as a surrogate for cis-1,3-dichloropropene and trans-1,3-dichloropropene.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)
Detection Limit Above Screening Level (DLASL), not quantitatively evaluated in HHRA

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)
Detection Limit Below Screening Level (DLBSL)

COPC = Chemical of Potential Concern

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered

N = North Carolina 15A NCAC 2B Human Health, Amended Feb. 2010.

A= Federal Ambient Water Quality Criteria, Consumption of Water and Organisms

R-n = USEPA Regional Screening Level, noncarcinogenic (therefore, RSL divided by 10, see text)

R-c = USEPA Regional Screening Level, Carcinogenic

N/A = Not available

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TABLE 2.5

Occurrence, Distribution And Selection of Chemicals of Potential Concern
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Scenario Timeframe: Future Medium: Sediment Exposure Medium: Sediment

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Drainage Ditches	71-55-6	1,1,1-Trichloroethane	ND	ND	MG/KG		0/2	0.083 - 0.66	6.6E-01	ND	6.4E+02 NS	N/A	N/A	NO	DLBSL
	79-34-5	1,1,2,2-Tetrachloroethane	ND	ND	MG/KG		0/2	0.083 - 0.66	6.6E-01	ND	5.6E-01 C	N/A	N/A	YES	DLASL
	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	ND	ND	MG/KG		0/2	0.42 - 3.3	3.3E+00	ND	9.1E+02 N	N/A	N/A	NO	DLBSL
	79-00-5	1,1,2-Trichloroethane	ND	ND	MG/KG		0/2	0.083 - 0.66	6.6E-01	ND	1.6E-01 C**	N/A	N/A	YES	DLASL
	75-34-3	1,1-Dichloroethane	ND	ND	MG/KG		0/2	0.083 - 0.66	6.6E-01	ND	3.3E+00 C	N/A	N/A	NO	DLBSL
	75-35-4	1,1-Dichloroethene	ND	ND	MG/KG		0/2	0.083 - 0.66	6.6E-01	ND	2.4E+01 N	N/A	N/A	NO	DLBSL
	120-82-1	1,2,4-Trichlorobenzene	ND	ND	MG/KG		0/2	0.17 - 1.3	1.3E+00	ND	6.2E+00 C**	N/A	N/A	NO	DLBSL
	96-12-8	1,2-Dibromo-3-chloropropane	ND	ND	MG/KG		0/2	0.42 - 3.3	3.3E+00	ND	5.4E-03 C	N/A	N/A	YES	DLASL
	106-93-4	1,2-Dibromoethane	ND	ND	MG/KG		0/2	0.083 - 0.66	6.6E-01	ND	3.4E-02 C	N/A	N/A	YES	DLASL
	95-50-1	1,2-Dichlorobenzene	ND	ND	MG/KG		0/2	0.083 - 0.66	6.6E-01	ND	1.9E+02 N	N/A	N/A	NO	DLBSL
	107-06-2	1,2-Dichloroethane	ND	ND	MG/KG		0/2	0.083 - 0.66	6.6E-01	ND	4.3E-01 C*	N/A	N/A	YES	DLASL
	78-87-5	1,2-Dichloropropane	ND	ND	MG/KG		0/2	0.083 - 0.66	6.6E-01	ND	9.4E-01 C*	N/A	N/A	NO	DLBSL
	541-73-1	1,3-Dichlorobenzene	ND	ND	MG/KG		0/2	0.083 - 0.66	6.6E-01	ND	2.4E+00 C	N/A	N/A	NO	DLBSL
	106-46-7	1,4-Dichlorobenzene	ND	ND	MG/KG		0/2	0.083 - 0.66	6.6E-01	ND	2.4E+00 C	N/A	N/A	NO	DLBSL
	78-93-3	2-Butanone	5.7E-02 J	5.7E-02 J	MG/KG	IR49-SD03-11A	1/2	4.2 - 33	5.7E-02	1.0E+01 J	2.8E+03 N	N/A	N/A	NO	BSL
	591-78-6	2-Hexanone	ND	ND	MG/KG		0/2	4.2 - 33	3.3E+01	ND	2.1E+01 N	N/A	N/A	YES	DLASL
	108-10-1	4-Methyl-2-pentanone	ND	ND	MG/KG		0/2	4.2 - 33	3.3E+01	ND	5.3E+02 N	N/A	N/A	NO	DLBSL
	67-64-1	Acetone	ND	ND	MG/KG		0/2	1.3 - 9.9	9.9E+00	3.0E+02 J	6.1E+03 N	N/A	N/A	NO	DLBSL
	71-43-2	Benzene	ND	ND	MG/KG		0/2	0.083 - 0.66	6.6E-01	1.3E+00	1.1E+00 C*	N/A	N/A	NO	DLBSL
	75-27-4	Bromodichloromethane	ND	ND	MG/KG		0/2	0.083 - 0.66	6.6E-01	ND	2.7E-01 C	N/A	N/A	YES	DLASL
	75-25-2	Bromoform	ND	ND	MG/KG		0/2	0.083 - 0.66	6.6E-01	ND	6.2E+01 C*	N/A	N/A	NO	DLBSL
	74-83-9	Bromomethane	ND	ND	MG/KG		0/2	0.083 - 0.66	6.6E-01	ND	7.3E-01 N	N/A	N/A	NO	DLBSL
	75-15-0	Carbon disulfide	8.2E-02 J	9.3E-02 J	MG/KG	IR49-SD02-11A	2/2	0.42 - 3.3	9.3E-02	1.3E+00	8.2E+01 N	N/A	N/A	NO	BSL
	56-23-5	Carbon tetrachloride	ND	ND	MG/KG		0/2	0.083 - 0.66	6.6E-01	ND	6.1E-01 C	N/A	N/A	YES	DLASL
	108-90-7	Chlorobenzene	ND	ND	MG/KG		0/2	0.083 - 0.66	6.6E-01	ND	2.9E+01 N	N/A	N/A	NO	DLBSL
	75-00-3	Chloroethane	ND	ND	MG/KG		0/2	0.083 - 0.66	6.6E-01	ND	1.5E+03 N	N/A	N/A	NO	DLBSL
	67-66-3	Chloroform	ND	ND	MG/KG		0/2	0.083 - 0.66	6.6E-01	ND	2.9E-01 C	N/A	N/A	YES	DLASL
	74-87-3	Chloromethane	ND	ND	MG/KG		0/2	0.083 - 0.66	6.6E-01	ND	1.2E+01 N	N/A	N/A	NO	DLBSL
	156-59-2	cis-1,2-Dichloroethene	ND	ND	MG/KG		0/2	0.083 - 0.66	6.6E-01	ND	1.6E+01 N	N/A	N/A	NO	DLBSL
	10061-01-5	cis-1,3-Dichloropropene	ND	ND	MG/KG		0/2	0.083 - 0.66	6.6E-01	ND	1.7E+00 C*	N/A	N/A	NO	DLBSL
	110-82-7	Cyclohexane	ND	ND	MG/KG		0/2	0.42 - 3.3	3.3E+00	9.3E-01 J	1.2E+02 NS	N/A	N/A	NO	DLBSL
	124-48-1	Dibromochloromethane	ND	ND	MG/KG		0/2	0.083 - 0.66	6.6E-01	ND	6.8E-01 C	N/A	N/A	NO	DLBSL

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TABLE 2.5

Occurrence, Distribution And Selection of Chemicals of Potential Concern

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
	75-71-8	Dichlorodifluoromethane (Freon-12)	ND	ND	MG/KG		0/2	0.083 - 0.66	6.6E-01	ND	9.4E+00 N	N/A	N/A	NO	DLBSL
	100-41-4	Ethylbenzene	ND	ND	MG/KG		0/2	0.083 - 0.66	6.6E-01	ND	5.4E+00 C	N/A	N/A	NO	DLBSL
	98-82-8	Isopropylbenzene	ND	ND	MG/KG		0/2	0.083 - 0.66	6.6E-01	ND	2.1E+02 N	N/A	N/A	NO	DLBSL
	79-20-9	Methyl acetate	1.3E+00	1.9E+00 J	MG/KG	IR49-SD02-11A	2/2	0.42 - 3.3	1.9E+00	8.2E+00	7.8E+03 N	N/A	N/A	NO	BSL
	108-87-2	Methylcyclohexane	ND	ND	MG/KG		0/2	0.42 - 3.3	3.3E+00	9.9E-01 J	5.7E+01 N	N/A	N/A	NO	DLBSL
	75-09-2	Methylene chloride	ND	ND	MG/KG		0/2	0.42 - 3.3	3.3E+00	ND	1.1E+01 C	N/A	N/A	NO	DLBSL
	1634-04-4	Methyl-tert-butyl ether (MTBE)	ND	ND	MG/KG		0/2	0.083 - 0.66	6.6E-01	ND	4.3E+01 C	N/A	N/A	NO	DLBSL
	100-42-5	Styrene	ND	ND	MG/KG		0/2	0.083 - 0.66	6.6E-01	ND	6.3E+02 N	N/A	N/A	NO	DLBSL
	127-18-4	Tetrachloroethene	ND	ND	MG/KG		0/2	0.083 - 0.66	6.6E-01	5.9E-01 J	5.5E-01 C	N/A	N/A	YES	DLASL
	108-88-3	Toluene	ND	ND	MG/KG		0/2	0.083 - 0.66	6.6E-01	3.7E+00	5.0E+02 N	N/A	N/A	NO	DLBSL
	156-60-5	trans-1,2-Dichloroethene	ND	ND	MG/KG		0/2	0.083 - 0.66	6.6E-01	ND	1.5E+01 N	N/A	N/A	NO	DLBSL
	10061-02-6	trans-1,3-Dichloropropene	ND	ND	MG/KG		0/2	0.083 - 0.66	6.6E-01	ND	1.7E+00 C*	N/A	N/A	NO	DLBSL
	79-01-6	Trichloroethene	ND	ND	MG/KG		0/2	0.083 - 0.66	6.6E-01	ND	2.5E+00 C**	N/A	N/A	NO	DLBSL
	75-69-4	Trichlorofluoromethane (Freon-11)	ND	ND	MG/KG		0/2	0.083 - 0.66	6.6E-01	ND	7.9E+01 N	N/A	N/A	NO	DLBSL
	75-01-4	Vinyl chloride	ND	ND	MG/KG		0/2	0.083 - 0.66	6.6E-01	ND	6.0E-02 C	N/A	N/A	YES	DLASL
	1330-20-7	Xylene, total	ND	ND	MG/KG		0/2	0.25 - 2	2.0E+00	3.0E+00 J	6.3E+01 N	N/A	N/A	NO	DLBSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening. If not detected, maximum detection limit used for screening.

[3] Background values from IR49-SD01-11A.

[4] Oak Ridge National Laboratory (ORNL). June, 2011. Regional Screening Levels for Chemical Contaminants at Superfund Sites. [Online]. Adjusted (RSLs based on non-cancer (N) divided by 10) residential soil RSLs. Available: http://epa-prgs.ornl.gov/chemicals/index.shtml

RSL for n-hexane used as surrogate for methylcyclohexane.

RSL value for 1,4-dichlorobenzene used as a surrogate for 1,3-dichlorobenzene.

RSL value for 1,3-dichloropropene used as a surrogate for cis-1,3-dichloropropene and trans-1,3-dichloropropene.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)
Detection Limit Above Screening Level (DLASL), not quantitatively evaluated in HHRA

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)
Detection Limit Below Screening Level (DLBSL)

COPC = Chemical of Potential Concern

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered

J = Estimated Value

C = Carcinogenic

C* = N screening level < 100x C screening level, therefore C screening value used

C** = N screening level < 10x C screening level, therefore N screening value/10 used as screening level

N = Noncarcinogenic

S = noncarcinogenic based RSL higher than saturation concentration, therefore, soil saturation concentration used as screening level

N/A = Not applicable/not available

ND = not detected

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TABLE 2.5

Occurrence, Distribution And Selection of Chemicals of Potential Concern

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
New River	71-55-6	1,1,1-Trichloroethane	ND	ND	MG/KG		0/3	0.0021 - 0.23	2.3E-01	N/A	6.4E+02 NS	N/A	N/A	NO	DLBSL
	79-34-5	1,1,2,2-Tetrachloroethane	ND	ND	MG/KG		0/3	0.0021 - 0.23	2.3E-01	N/A	5.6E-01 C	N/A	N/A	NO	DLBSL
	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	ND	ND	MG/KG		0/3	0.0052 - 1.2	1.2E+00	N/A	9.1E+02 N	N/A	N/A	NO	DLBSL
	79-00-5	1,1,2-Trichloroethane	ND	ND	MG/KG		0/3	0.0021 - 0.23	2.3E-01	N/A	1.6E-01 C**	N/A	N/A	YES	DLASL
	75-34-3	1,1-Dichloroethane	ND	ND	MG/KG		0/3	0.0021 - 0.23	2.3E-01	N/A	3.3E+00 C	N/A	N/A	NO	DLBSL
	75-35-4	1,1-Dichloroethene	ND	ND	MG/KG		0/3	0.0021 - 0.23	2.3E-01	N/A	2.4E+01 N	N/A	N/A	NO	DLBSL
	120-82-1	1,2,4-Trichlorobenzene	ND	ND	MG/KG		0/3	0.0021 - 0.46	4.6E-01	N/A	6.2E+00 C**	N/A	N/A	NO	DLBSL
	96-12-8	1,2-Dibromo-3-chloropropane	ND	ND	MG/KG		0/3	0.0052 - 1.2	1.2E+00	N/A	5.4E-03 C	N/A	N/A	YES	DLASL
	106-93-4	1,2-Dibromoethane	ND	ND	MG/KG		0/3	0.0031 - 0.23	2.3E-01	N/A	3.4E-02 C	N/A	N/A	YES	DLASL
	95-50-1	1,2-Dichlorobenzene	ND	ND	MG/KG		0/3	0.001 - 0.23	2.3E-01	N/A	1.9E+02 N	N/A	N/A	NO	DLBSL
	107-06-2	1,2-Dichloroethane	ND	ND	MG/KG		0/3	0.001 - 0.23	2.3E-01	N/A	4.3E-01 C*	N/A	N/A	NO	DLBSL
	78-87-5	1,2-Dichloropropane	ND	ND	MG/KG		0/3	0.0031 - 0.23	2.3E-01	N/A	9.4E-01 C*	N/A	N/A	NO	DLBSL
	541-73-1	1,3-Dichlorobenzene	ND	ND	MG/KG		0/3	0.001 - 0.23	2.3E-01	N/A	2.4E+00 C	N/A	N/A	NO	DLBSL
	106-46-7	1,4-Dichlorobenzene	ND	ND	MG/KG		0/3	0.001 - 0.23	2.3E-01	N/A	2.4E+00 C	N/A	N/A	NO	DLBSL
	78-93-3	2-Butanone	3.4E-03 J	3.4E-03 J	MG/KG	IR49-SD04-11B	1/3	0.01 - 12	3.4E-03	N/A	2.8E+03 N	N/A	N/A	NO	BSL
	591-78-6	2-Hexanone	ND	ND	MG/KG		0/3	0.01 - 12	1.2E+01	N/A	2.1E+01 N	N/A	N/A	NO	DLBSL
	108-10-1	4-Methyl-2-pentanone	ND	ND	MG/KG		0/3	0.01 - 12	1.2E+01	N/A	5.3E+02 N	N/A	N/A	NO	DLBSL
	67-64-1	Acetone	2.8E-02 J	2.8E-02 J	MG/KG	IR49-SD04-11B	1/3	0.016 - 3.5	2.8E-02	N/A	6.1E+03 N	N/A	N/A	NO	BSL
	71-43-2	Benzene	4.6E-04 J	4.6E-04 J	MG/KG	IR49-SD04-11B	1/3	0.001 - 0.23	4.6E-04	N/A	1.1E+00 C*	N/A	N/A	NO	BSL
	75-27-4	Bromodichloromethane	ND	ND	MG/KG		0/3	0.001 - 0.23	2.3E-01	N/A	2.7E-01 C	N/A	N/A	NO	DLBSL
	75-25-2	Bromoform	ND	ND	MG/KG		0/3	0.0021 - 0.23	2.3E-01	N/A	6.2E+01 C*	N/A	N/A	NO	DLBSL
	74-83-9	Bromomethane	ND	ND	MG/KG		0/3	0.0042 - 0.23	2.3E-01	N/A	7.3E-01 N	N/A	N/A	NO	DLBSL
	75-15-0	Carbon disulfide	8.1E-03	4.6E-02 J	MG/KG	IR49-SD05-11A	2/3	0.001 - 1.2	4.6E-02	N/A	8.2E+01 N	N/A	N/A	NO	BSL
	56-23-5	Carbon tetrachloride	ND	ND	MG/KG		0/3	0.0021 - 0.23	2.3E-01	N/A	6.1E-01 C	N/A	N/A	NO	DLBSL
	108-90-7	Chlorobenzene	ND	ND	MG/KG		0/3	0.001 - 0.23	2.3E-01	N/A	2.9E+01 N	N/A	N/A	NO	DLBSL
	75-00-3	Chloroethane	ND	ND	MG/KG		0/3	0.0021 - 0.23	2.3E-01	N/A	1.5E+03 N	N/A	N/A	NO	DLBSL
	67-66-3	Chloroform	ND	ND	MG/KG		0/3	0.001 - 0.23	2.3E-01	N/A	2.9E-01 C	N/A	N/A	NO	DLBSL
	74-87-3	Chloromethane	ND	ND	MG/KG		0/3	0.001 - 0.23	2.3E-01	N/A	1.2E+01 N	N/A	N/A	NO	DLBSL
	156-59-2	cis-1,2-Dichloroethene	ND	ND	MG/KG		0/3	0.001 - 0.23	2.3E-01	N/A	1.6E+01 N	N/A	N/A	NO	DLBSL
	10061-01-5	cis-1,3-Dichloropropene	ND	ND	MG/KG		0/3	0.001 - 0.23	2.3E-01	N/A	1.7E+00 C*	N/A	N/A	NO	DLBSL
	110-82-7	Cyclohexane	ND	ND	MG/KG		0/3	0.0052 - 1.2	1.2E+00	N/A	1.2E+02 NS	N/A	N/A	NO	DLBSL
	124-48-1	Dibromochloromethane	ND	ND	MG/KG		0/3	0.001 - 0.23	2.3E-01	N/A	6.8E-01 C	N/A	N/A	NO	DLBSL
	75-71-8	Dichlorodifluoromethane (Freon-12)	3.7E-04 J	3.7E-04 J	MG/KG	IR49-SD04-11B	1/3	0.0021 - 0.23	3.7E-04	N/A	9.4E+00 N	N/A	N/A	NO	BSL

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TABLE 2.5

Occurrence, Distribution And Selection of Chemicals of Potential Concern
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Scenario Timeframe: Future Medium: Sediment Exposure Medium: Sediment

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
	100-41-4	Ethylbenzene	3.1E-04 J	3.1E-04 J	MG/KG	IR49-SD04-11B	1/3	0.001 - 0.23	3.1E-04	N/A	5.4E+00 C	N/A	N/A	NO	BSL
	98-82-8	Isopropylbenzene	ND	ND	MG/KG		0/3	0.001 - 0.23	2.3E-01	N/A	2.1E+02 N	N/A	N/A	NO	DLBSL
	79-20-9	Methyl acetate	1.4E-01 J	7.0E-01 J	MG/KG	IR49-SD05-11A	2/3	0.0052 - 1.2	7.0E-01	N/A	7.8E+03 N	N/A	N/A	NO	BSL
	108-87-2	Methylcyclohexane	ND	ND	MG/KG		0/3	0.0052 - 1.2	1.2E+00	N/A	5.7E+01 N	N/A	N/A	NO	DLBSL
	75-09-2	Methylene chloride	5.4E-04 J	5.4E-04 J	MG/KG	IR49-SD04-11B	1/3	0.016 - 1.2	5.4E-04	N/A	1.1E+01 C	N/A	N/A	NO	BSL
	1634-04-4	Methyl-tert-butyl ether (MTBE)	ND	ND	MG/KG		0/3	0.001 - 0.23	2.3E-01	N/A	4.3E+01 C	N/A	N/A	NO	DLBSL
	100-42-5	Styrene	ND	ND	MG/KG		0/3	0.001 - 0.23	2.3E-01	N/A	6.3E+02 N	N/A	N/A	NO	DLBSL
	127-18-4	Tetrachloroethene	ND	ND	MG/KG		0/3	0.0021 - 0.23	2.3E-01	N/A	5.5E-01 C	N/A	N/A	NO	DLBSL
	108-88-3	Toluene	6.0E-04 J	6.0E-04 J	MG/KG	IR49-SD04-11B	1/3	0.0021 - 0.23	6.0E-04	N/A	5.0E+02 N	N/A	N/A	NO	BSL
	156-60-5	trans-1,2-Dichloroethene	ND	ND	MG/KG		0/3	0.001 - 0.23	2.3E-01	N/A	1.5E+01 N	N/A	N/A	NO	DLBSL
	10061-02-6	trans-1,3-Dichloropropene	ND	ND	MG/KG		0/3	0.0031 - 0.23	2.3E-01	N/A	1.7E+00 C*	N/A	N/A	NO	DLBSL
	79-01-6	Trichloroethene	ND	ND	MG/KG		0/3	0.0021 - 0.23	2.3E-01	N/A	2.5E+00 C**	N/A	N/A	NO	DLBSL
	75-69-4	Trichlorofluoromethane (Freon-11)	ND	ND	MG/KG		0/3	0.0021 - 0.23	2.3E-01	N/A	7.9E+01 N	N/A	N/A	NO	DLBSL
	75-01-4	Vinyl chloride	ND	ND	MG/KG		0/3	0.001 - 0.23	2.3E-01	N/A	6.0E-02 C	N/A	N/A	YES	DLASL
	1330-20-7	Xylene, total	ND	ND	MG/KG		0/3	0.0031 - 0.69	6.9E-01	N/A	6.3E+01 N	N/A	N/A	NO	DLBSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening. If not detected, maximum detection limit used for screening.

[3] Background values not available.

[4] Oak Ridge National Laboratory (ORNL). June, 2011. Regional Screening Levels for Chemical Contaminants at Superfund Sites. [Online]. Adjusted (RSLs based on non-cancer (N) divided by 10) residential soil RSLs. Available: http://epa-prgs.ornl.gov/chemicals/index.shtml

RSL for n-hexane used as surrogate for methylcyclohexane.

RSL value for 1,4-dichlorobenzene used as a surrogate for 1,3-dichlorobenzene.

RSL value for 1,3-dichloropropene used as a surrogate for cis-1,3-dichloropropene and trans-1,3-dichloropropene.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)
Detection Limit Above Screening Level (DLASL), not quantitatively evaluated in HHRA

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)
Detection Limit Below Screening Level (DLBSL)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
C = Carcinogenic
C* = N screening level < 100x C screening level, therefore C screening value used
C** = N screening level < 10x C screening level, therefore N screening value/10 used as screening level
N = Noncarcinogenic
S = noncarcinogenic based RSL higher than saturation concentration, therefore, soil saturation concentration used as screening level
N/A = Not applicable/not available

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TABLE 2.7

Occurrence, Distribution And Selection of Chemicals of Potential Concern

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Soil*	71-55-6	1,1,1-Trichloroethane	ND	ND	MG/KG		0/22	0.0017 - 0.41	4.1E-01	N/A	6.4E+02 NS	1.2E+00	NCSSL	NO	DLBSL
	79-34-5	1,1,2,2-Tetrachloroethane	8.6E-04 J	2.4E-03 J	MG/KG	IR49-IS02-6-7-09C	4/22	0.0017 - 0.41	2.4E-03	N/A	5.6E-01 C	1.2E-03	NCSSL	NO	BSL
	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113	ND	ND	MG/KG		0/22	0.0042 - 2.1	2.1E+00	N/A	9.1E+02 N	9.2E+03	NCSSL	NO	DLBSL
	79-00-5	1,1,2-Trichloroethane	1.9E-03 J	1.9E-03 J	MG/KG	IR49-SB09-3-4-11A	1/22	0.0017 - 0.41	1.9E-03	N/A	1.6E-01 C**	N/A		NO	BSL
	75-34-3	1,1-Dichloroethane	ND	ND	MG/KG		0/22	0.0017 - 0.41	4.1E-01	N/A	3.3E+00 C	3.0E-02	NCSSL	NO	DLBSL
	75-35-4	1,1-Dichloroethene	ND	ND	MG/KG		0/22	0.0017 - 0.41	4.1E-01	N/A	2.4E+01 N	4.6E-02	NCSSL	NO	DLBSL
	120-82-1	1,2,4-Trichlorobenzene	ND	ND	MG/KG		0/22	0.0017 - 0.82	8.2E-01	N/A	6.2E+00 C**	2.2E+00	NCSSL	NO	DLBSL
	96-12-8	1,2-Dibromo-3-chloropropane	ND	ND	MG/KG		0/22	0.0042 - 2.1	2.1E+00	N/A	5.4E-03 C	2.5E-04	NCSSL	YES	DLASL
	106-93-4	1,2-Dibromoethane	ND	ND	MG/KG		0/22	0.0025 - 0.41	4.1E-01	N/A	3.4E-02 C	9.7E-05	NCSSL	YES	DLASL
	95-50-1	1,2-Dichlorobenzene	ND	ND	MG/KG		0/22	0.00083 - 0.41	4.1E-01	N/A	1.9E+02 N	2.4E-01	NCSSL	NO	DLBSL
	78-87-5	1,2-Dichloropropane	ND	ND	MG/KG		0/22	0.0025 - 0.41	4.1E-01	N/A	9.4E-01 C*	3.3E-03	NCSSL	NO	DLBSL
	541-73-1	1,3-Dichlorobenzene	ND	ND	MG/KG		0/22	0.00083 - 0.41	4.1E-01	N/A	2.4E+00 C	7.6E+00	NCSSL	NO	DLBSL
	106-46-7	1,4-Dichlorobenzene	ND	ND	MG/KG		0/22	0.00083 - 0.41	4.1E-01	N/A	2.4E+00 C	7.0E-02	NCSSL	NO	DLBSL
	78-93-3	2-Butanone	2.2E-03 J	5.6E-02 J	MG/KG	IR49-SB13D-1_5-2-11A	6/18	0.0094 - 21	5.6E-02	N/A	2.8E+03 N	1.6E+01	NCSSL	NO	BSL
	591-78-6	2-Hexanone	ND	ND	MG/KG		0/22	0.0083 - 21	2.1E+01	N/A	2.1E+01 N	1.2E+00	NCSSL	YES	DLASL
	108-10-1	4-Methyl-2-pentanone	ND	ND	MG/KG		0/22	0.0083 - 21	2.1E+01	N/A	5.3E+02 NS	N/A		NO	DLBSL
	67-64-1	Acetone	3.5E-02 J	2.2E-01 J	MG/KG	IR49-SS07-11A	6/19	0.0096 - 6.2	2.2E-01	N/A	6.1E+03 N	2.4E+01	NCSSL	NO	BSL
	71-43-2	Benzene	1.8E-03 J	1.9E-03 J	MG/KG	IR49-SS07-11A	2/22	0.00083 - 0.41	1.9E-03	N/A	1.1E+00 C*	7.3E-03	NCSSL	NO	BSL
	75-27-4	Bromodichloromethane	ND	ND	MG/KG		0/22	0.00083 - 0.41	4.1E-01	N/A	2.7E-01 C	2.9E-03	NCSSL	YES	DLASL
	75-25-2	Bromoform	ND	ND	MG/KG		0/22	0.0017 - 0.41	4.1E-01	N/A	6.2E+01 C*	1.9E-02	NCSSL	NO	DLBSL
	74-83-9	Bromomethane	ND	ND	MG/KG		0/22	0.0033 - 0.41	4.1E-01	N/A	7.3E-01 N	N/A		NO	DLBSL
	75-15-0	Carbon disulfide	2.1E-04 J	4.5E-02 J	MG/KG	IR49-SS12-11A	14/22	0.00083 - 2.1	4.5E-02	N/A	8.2E+01 N	3.8E+00	NCSSL	NO	BSL
	56-23-5	Carbon tetrachloride	ND	ND	MG/KG		0/22	0.0017 - 0.41	4.1E-01	N/A	6.1E-01 C	2.0E-03	NCSSL	NO	DLBSL
	108-90-7	Chlorobenzene	ND	ND	MG/KG		0/22	0.00083 - 0.41	4.1E-01	N/A	2.9E+01 N	4.5E-01	NCSSL	NO	DLBSL
	75-00-3	Chloroethane	ND	ND	MG/KG		0/22	0.0017 - 0.41	4.1E-01	N/A	1.5E+03 N	1.6E+01	NCSSL	NO	DLBSL
	67-66-3	Chloroform	ND	ND	MG/KG		0/22	0.00083 - 0.41	4.1E-01	N/A	2.9E-01 C	3.4E-01	NCSSL	YES	DLASL
	74-87-3	Chloromethane	ND	ND	MG/KG		0/22	0.00083 - 0.41	4.1E-01	N/A	1.2E+01 N	1.5E-02	NCSSL	NO	DLBSL
	156-59-2	cis-1,2-Dichloroethene	1.2E-03 J	1.2E-03 J	MG/KG	IR49-IS02-6-7-09C	1/22	0.00083 - 0.41	1.2E-03	N/A	1.6E+01 N	3.6E-01	NCSSL	NO	BSL
	10061-01-5	cis-1,3-Dichloropropene	ND	ND	MG/KG		0/22	0.00083 - 0.41	4.1E-01	N/A	1.7E+00 C*	2.3E-03	NCSSL	NO	DLBSL
	110-82-7	Cyclohexane	6.3E-04 J	9.8E-04 J	MG/KG	IR49-SS07-11A	3/22	0.0042 - 2.1	9.8E-04	N/A	1.2E+02 NS	N/A		NO	BSL
	124-48-1	Dibromochloromethane	ND	ND	MG/KG		0/22	0.00083 - 0.41	4.1E-01	N/A	6.8E-01 C	1.9E-03	NCSSL	NO	DLBSL
	75-71-8	Dichlorodifluoromethane (Freon-12)	ND	ND	MG/KG		0/22	0.0017 - 0.41	4.1E-01	N/A	9.4E+00 N	2.9E+01	NCSSL	NO	DLBSL
	100-41-4	Ethylbenzene	7.8E-04 J	3.3E-03 J	MG/KG	IR49-SB13-1_5-2-11A	3/22	0.00083 - 0.41	3.3E-03	N/A	5.4E+00 C	8.1E+00	NCSSL	NO	BSL

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TABLE 2.7

Occurrence, Distribution And Selection of Chemicals of Potential Concern

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
	98-82-8	Isopropylbenzene	ND	ND	MG/KG		0/22	0.00083 - 0.41	4.1E-01	N/A	2.1E+02 N	1.3E+00	NCSSL	NO	DLBSL
	79-20-9	Methyl acetate	2.1E-03 J	5.0E+00 J	MG/KG	IR49-SS12-11A	11/22	0.0042 - 2.1	5.0E+00	N/A	7.8E+03 N	N/A		NO	BSL
	108-87-2	Methylcyclohexane	6.9E-04 J	1.1E-03 J	MG/KG	IR49-SS07-11A	3/22	0.0042 - 2.1	1.1E-03	N/A	5.7E+01 N	N/A		NO	BSL
	75-09-2	Methylene chloride	5.3E-03 J	9.1E-02 J	MG/KG	IR49-SS12D-11B	4/22	0.0094 - 2.1	9.1E-02	N/A	1.1E+01 C	2.3E-02	NCSSL	NO	BSL
	1634-04-4	Methyl-tert-butyl ether (MTBE)	ND	ND	MG/KG		0/22	0.00083 - 0.41	4.1E-01	N/A	4.3E+01 C	8.5E-02	NCSSL	NO	DLBSL
	100-42-5	Styrene	ND	ND	MG/KG		0/22	0.00083 - 0.41	4.1E-01	N/A	6.3E+02 N	9.2E-01	NCSSL	NO	DLBSL
	127-18-4	Tetrachloroethene	ND	ND	MG/KG		0/22	0.0017 - 0.41	4.1E-01	N/A	5.5E-01 C	5.0E-03	NCSSL	NO	DLBSL
	108-88-3	Toluene	3.4E-04 J	3.1E-03 J	MG/KG	IR49-SB13-1_5-2-11A	5/22	0.0017 - 0.41	3.1E-03	N/A	5.0E+02 N	5.5E+00	NCSSL	NO	BSL
	156-60-5	trans-1,2-Dichloroethene	ND	ND	MG/KG		0/22	0.00083 - 0.41	4.1E-01	N/A	1.5E+01 N	5.1E-01	NCSSL	NO	DLBSL
	10061-02-6	trans-1,3-Dichloropropene	ND	ND	MG/KG		0/22	0.0025 - 0.41	4.1E-01	N/A	1.7E+00 C*	2.3E-03	NCSSL	NO	DLBSL
	79-01-6	Trichloroethene	1.3E-03 J	4.7E-03 J	MG/KG	IR49-SS07-11A	3/22	0.0017 - 0.41	4.7E-03	N/A	2.5E+00 C**	1.8E-02	NCSSL	NO	BSL
	75-69-4	Trichlorofluoromethane (Freon-11)	3.9E-02 J	3.9E-02 J	MG/KG	IR49-SS03-11A	1/22	0.0017 - 0.41	3.9E-02	N/A	7.9E+01 N	2.4E+01	NCSSL	NO	BSL
	75-01-4	Vinyl chloride	ND	ND	MG/KG		0/22	0.00083 - 0.41	4.1E-01	N/A	6.0E-02 C	1.9E-04	NCSSL	YES	DLASL
	1330-20-7	Xylene, total	3.2E-03 J	3.2E-03 J	MG/KG	IR49-IS01-7-8-09C	1/22	0.0025 - 1.2	3.2E-03	N/A	6.3E+01 N	6.0E+00	NCSSL	NO	BSL
	92-52-4	1,1-Biphenyl	ND	ND	MG/KG		0/2	0.25 - 0.26	2.6E-01	ND	5.1E+00 N	4.3E+01	NCSSL	NO	DLBSL
	108-60-1	2,2'-Oxybis(1-chloropropane)	ND	ND	MG/KG		0/2	0.25 - 0.26	2.6E-01	ND	4.6E+00 C	N/A		NO	DLBSL
	95-95-4	2,4,5-Trichlorophenol	ND	ND	MG/KG		0/2	0.49 - 0.51	5.1E-01	ND	6.1E+02 N	N/A		NO	DLBSL
	88-06-2	2,4,6-Trichlorophenol	ND	ND	MG/KG		0/2	0.25 - 0.26	2.6E-01	ND	6.1E+00 C**	N/A		NO	DLBSL
	120-83-2	2,4-Dichlorophenol	ND	ND	MG/KG		0/2	0.25 - 0.26	2.6E-01	ND	1.8E+01 N	N/A		NO	DLBSL
	105-67-9	2,4-Dimethylphenol	ND	ND	MG/KG		0/2	0.25 - 0.26	2.6E-01	ND	1.2E+02 N	1.4E+00	NCSSL	NO	DLBSL
	51-28-5	2,4-Dinitrophenol	ND	ND	MG/KG		0/2	0.49 - 0.51	5.1E-01	ND	1.2E+01 N	N/A		NO	DLBSL
	121-14-2	2,4-Dinitrotoluene	ND	ND	MG/KG		0/2	0.25 - 0.26	2.6E-01	ND	1.6E+00 C*	N/A		NO	DLBSL
	606-20-2	2,6-Dinitrotoluene	ND	ND	MG/KG		0/2	0.25 - 0.26	2.6E-01	ND	6.1E+00 N	N/A		NO	DLBSL
	91-58-7	2-Chloronaphthalene	ND	ND	MG/KG		0/2	0.25 - 0.26	2.6E-01	ND	1.8E+02 N	N/A		NO	DLBSL
	95-57-8	2-Chlorophenol	ND	ND	MG/KG		0/2	0.25 - 0.26	2.6E-01	ND	3.9E+01 N	4.1E-03	NCSSL	NO	DLBSL
	91-57-6	2-Methylnaphthalene	ND	ND	MG/KG		0/2	0.25 - 0.26	2.6E-01	ND	3.1E+01 N	1.6E+00	NCSSL	NO	DLBSL
	95-48-7	2-Methylphenol	ND	ND	MG/KG		0/2	0.25 - 0.26	2.6E-01	ND	3.1E+02 N	N/A		NO	DLBSL
	88-74-4	2-Nitroaniline	ND	ND	MG/KG		0/2	0.49 - 0.51	5.1E-01	ND	6.1E+01 N	N/A		NO	DLBSL
	88-75-5	2-Nitrophenol	ND	ND	MG/KG		0/2	0.25 - 0.26	2.6E-01	ND	3.9E+01 N	N/A		NO	DLBSL
	91-94-1	3,3'-Dichlorobenzidine	ND	ND	MG/KG		0/2	0.25 - 0.26	2.6E-01	ND	1.1E+00 C	N/A		NO	DLBSL
	99-09-2	3-Nitroaniline	ND	ND	MG/KG		0/2	0.49 - 0.51	5.1E-01	ND	6.1E+01 N	N/A		NO	DLBSL
	534-52-1	4,6-Dinitro-2-methylphenol	ND	ND	MG/KG		0/2	0.49 - 0.51	5.1E-01	ND	4.9E-01 N	N/A		YES	DLASL
	101-55-3	4-Bromophenyl-phenylether	ND	ND	MG/KG		0/2	0.25 - 0.26	2.6E-01	ND	N/A	N/A		NO	DLBSL
	59-50-7	4-Chloro-3-methylphenol	ND	ND	MG/KG		0/2	0.25 - 0.26	2.6E-01	ND	6.1E+02 N	N/A		NO	DLBSL

Appendix F

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Occurrence, Distribution And Selection of Chemicals of Potential Concern

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
	106-47-8	4-Chloroaniline	ND	ND	MG/KG		0/2	0.25 - 0.26	2.6E-01	ND	2.4E+00 C	N/A		NO	DLBSL
	7005-72-3	4-Chlorophenyl-phenylether	ND	ND	MG/KG		0/2	0.25 - 0.26	2.6E-01	ND	3.1E+01 N	N/A		NO	DLBSL
	106-44-5	4-Methylphenol	ND	ND	MG/KG		0/2	0.25 - 0.26	2.6E-01	ND	3.1E+01 N	4.0E-01	NCSSL	NO	DLBSL
	100-01-6	4-Nitroaniline	ND	ND	MG/KG		0/2	0.49 - 0.51	5.1E-01	ND	2.4E+01 C*	N/A		NO	DLBSL
	100-02-7	4-Nitrophenol	ND	ND	MG/KG		0/2	0.49 - 0.51	5.1E-01	ND	4.8E+00 C*	N/A		NO	DLBSL
	83-32-9	Acenaphthene	ND	ND	MG/KG		0/2	0.25 - 0.26	2.6E-01	ND	3.4E+02 N	8.4E+00	NCSSL	NO	DLBSL
	208-96-8	Acenaphthylene	ND	ND	MG/KG		0/2	0.25 - 0.26	2.6E-01	ND	3.4E+02 N	1.1E+01	NCSSL	NO	DLBSL
	98-86-2	Acetophenone	ND	ND	MG/KG		0/2	0.25 - 0.26	2.6E-01	ND	7.8E+02 N	N/A		NO	DLBSL
	120-12-7	Anthracene	ND	ND	MG/KG		0/2	0.25 - 0.26	2.6E-01	6.4E-02	1.7E+03 N	6.6E+02	NCSSL	NO	DLBSL
	1912-24-9	Atrazine	ND	ND	MG/KG		0/2	0.25 - 0.26	2.6E-01	ND	2.1E+00 C	2.5E-02	NCSSL	NO	DLBSL
	100-52-7	Benzaldehyde	ND	ND	MG/KG		0/2	0.25 - 0.26	2.6E-01	ND	7.8E+02 N	N/A		NO	DLBSL
	56-55-3	Benzo(a)anthracene	ND	ND	MG/KG		0/2	0.062 - 0.064	6.4E-02	9.4E-01	1.5E-01 C	1.8E-01	NCSSL	NO	DLBSL
	50-32-8	Benzo(a)pyrene	1.5E-03 J	1.5E-03 J	MG/KG	IR49-IS02-6-7-09C	1/2	0.0066 - 0.0069	1.5E-03	1.1E+00	1.5E-02 C	5.9E-02	NCSSL	NO	BSL
	205-99-2	Benzo(b)fluoranthene	2.3E-03 J	2.3E-03 J	MG/KG	IR49-IS02-6-7-09C	1/2	0.062 - 0.064	2.3E-03	1.8E+00	1.5E-01 C	6.0E-01	NCSSL	NO	BSL
	191-24-2	Benzo(g,h,i)perylene	ND	ND	MG/KG		0/2	0.25 - 0.26	2.6E-01	1.1E+00	1.7E+02 N	3.6E+02	NCSSL	NO	DLBSL
	207-08-9	Benzo(k)fluoranthene	ND	ND	MG/KG		0/2	0.25 - 0.26	2.6E-01	6.6E-01	1.5E+00 C	5.9E+00	NCSSL	NO	DLBSL
	111-91-1	bis(2-Chloroethoxy)methane	ND	ND	MG/KG		0/2	0.25 - 0.26	2.6E-01	ND	1.8E+01 N	N/A		NO	DLBSL
	111-44-4	bis(2-Chloroethyl)ether	ND	ND	MG/KG		0/2	0.25 - 0.26	2.6E-01	ND	2.1E-01 C	1.4E-04	NCSSL	YES	DLASL
	117-81-7	bis(2-Ethylhexyl)phthalate	ND	ND	MG/KG		0/2	0.25 - 0.26	2.6E-01	ND	3.5E+01 C*	7.2E+00	NCSSL	NO	DLBSL
	85-68-7	Butylbenzylphthalate	ND	ND	MG/KG		0/2	0.25 - 0.26	2.6E-01	ND	2.6E+02 C*	1.5E+02	NCSSL	NO	DLBSL
	105-60-2	Caprolactam	1.6E-01 J	2.0E-01 J	MG/KG	IR49-IS01-7-8-09C	2/2	0.25 - 0.26	2.0E-01	ND	3.1E+03 N	1.8E+01	NCSSL	NO	BSL
	86-74-8	Carbazole	ND	ND	MG/KG		0/2	0.25 - 0.26	2.6E-01	ND	N/A	N/A		NO	DLBSL
	218-01-9	Chrysene	ND	ND	MG/KG		0/2	0.25 - 0.26	2.6E-01	1.4E+00	1.5E+01 C	1.8E+01	NCSSL	NO	DLBSL
	53-70-3	Dibenz(a,h)anthracene	ND	ND	MG/KG		0/2	0.0066 - 0.0069	6.9E-03	ND	1.5E-02 C	1.9E-01	NCSSL	NO	DLBSL
	132-64-9	Dibenzofuran	ND	ND	MG/KG		0/2	0.25 - 0.26	2.6E-01	ND	7.8E+00 N	4.7E+00	NCSSL	NO	DLBSL
	84-66-2	Diethylphthalate	ND	ND	MG/KG		0/2	0.25 - 0.26	2.6E-01	ND	4.9E+03 N	3.7E+01	NCSSL	NO	DLBSL
	131-11-3	Dimethyl phthalate	ND	ND	MG/KG		0/2	0.25 - 0.26	2.6E-01	ND	N/A	N/A		NO	DLBSL
	84-74-2	Di-n-butylphthalate	ND	ND	MG/KG		0/2	0.25 - 0.26	2.6E-01	ND	6.1E+02 N	1.9E+01	NCSSL	NO	DLBSL
	117-84-0	Di-n-octylphthalate	ND	ND	MG/KG		0/2	0.41 - 0.43	4.3E-01	ND	3.5E+01 C*	3.8E+01	NCSSL	NO	DLBSL
	206-44-0	Fluoranthene	ND	ND	MG/KG		0/2	0.25 - 0.26	2.6E-01	1.6E+00	2.3E+02 N	3.3E+02	NCSSL	NO	DLBSL
	86-73-7	Fluorene	ND	ND	MG/KG		0/2	0.25 - 0.26	2.6E-01	ND	2.3E+02 N	5.6E+01	NCSSL	NO	DLBSL
	118-74-1	Hexachlorobenzene	ND	ND	MG/KG		0/2	0.25 - 0.26	2.6E-01	ND	3.0E-01 C	2.6E-03	NCSSL	NO	DLBSL
	87-68-3	Hexachlorobutadiene	ND	ND	MG/KG		0/2	0.25 - 0.26	2.6E-01	ND	6.1E+00 C**	8.7E-03	NCSSL	NO	DLBSL
	77-47-4	Hexachlorocyclopentadiene	ND	ND	MG/KG		0/2	0.25 - 0.26	2.6E-01	ND	3.7E+01 N	N/A		NO	DLBSL

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Exposure Medium: Soil*

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	67-72-1	Hexachloroethane	ND	ND	MG/KG		0/2	0.25 - 0.26	2.6E-01	ND	6.1E+00 C**	N/A		NO	DLBSL
	193-39-5	Indeno(1,2,3-cd)pyrene	ND	ND	MG/KG		0/2	0.062 - 0.064	6.4E-02	1.2E+00	1.5E-01 C	2.0E+00	NCSSL	NO	DLBSL
	78-59-1	Isophorone	ND	ND	MG/KG		0/2	0.062 - 0.064	6.4E-02	ND	5.1E+02 C*	2.1E-01	NCSSL	NO	DLBSL
	91-20-3	Naphthalene	ND	ND	MG/KG		0/2	0.25 - 0.26	2.6E-01	ND	3.6E+00 C*	2.1E-01	NCSSL	NO	DLBSL
	621-64-7	n-Nitroso-di-n-propylamine	ND	ND	MG/KG		0/2	0.031 - 0.033	3.3E-02	ND	6.9E-02 C	N/A		NO	DLBSL
	86-30-6	n-Nitrosodiphenylamine	ND	ND	MG/KG		0/2	0.25 - 0.26	2.6E-01	ND	9.9E+01 C	N/A		NO	DLBSL
	98-95-3	Nitrobenzene	ND	ND	MG/KG		0/2	0.25 - 0.26	2.6E-01	ND	4.8E+00 C*	N/A		NO	DLBSL
	87-86-5	Pentachlorophenol	ND	ND	MG/KG		0/2	0.021 - 0.021	2.1E-02	ND	8.9E-01 C	3.1E-02	NCSSL	NO	DLBSL
	85-01-8	Phenanthrene	ND	ND	MG/KG		0/2	0.25 - 0.26	2.6E-01	4.3E-01	1.7E+03 N	5.7E+01	NCSSL	NO	DLBSL
	108-95-2	Phenol	ND	ND	MG/KG		0/2	0.25 - 0.26	2.6E-01	ND	1.8E+03 N	2.3E-01	NCSSL	NO	DLBSL
	129-00-0	Pyrene	ND	ND	MG/KG		0/2	0.25 - 0.26	2.6E-01	1.6E+00	1.7E+02 N	2.2E+02	NCSSL	NO	DLBSL
	7429-90-5	**Aluminum**	**1.5E+04**	**1.7E+04**	**MG/KG**	**IR49-IS01D-7-8-09C**	**2/2**	**12.6 - 12.6**	**1.7E+04**	**1.0E+04**	**7.7E+03 N**	**N/A**		**YES**	**ASL**
	7440-38-2	**Arsenic**	**2.1E+00 J**	**6.8E+00 J**	**MG/KG**	**IR49-IS02-6-7-09C**	**2/2**	**0.6 - 0.63**	**6.8E+00**	**6.3E-01**	**3.9E-01 C***	**5.8E+00**	**NCSSL**	**YES**	**ASL**
	7440-39-3	Barium	1.9E+01	2.6E+01	MG/KG	IR49-IS01D-7-8-09C	2/2	2.5 - 2.5	2.6E+01	1.5E+01	1.5E+03 N	5.8E+02	NCSSL	NO	BSL
	7440-41-7	Beryllium	1.8E-01 J	1.9E-01 J	MG/KG	IR49-IS01D-7-8-09C	2/2	0.315 - 0.315	1.9E-01	1.7E-01	1.6E+01 N	N/A		NO	BSL
	7440-43-9	Cadmium	ND	ND	MG/KG		0/2	0.299 - 0.315	3.2E-01	2.3E-02	7.0E+00 N	3.0E+00	NCSSL	NO	DLBSL
	7440-70-2	Calcium	1.1E+02 J	3.4E+02	MG/KG	IR49-IS02-6-7-09C	2/2	315 - 315	3.4E+02	6.4E+03	N/A	N/A		NO	NUT
	7440-47-3	**Chromium**	**2.1E+01 J**	**2.8E+01 J**	**MG/KG**	**IR49-IS02-6-7-09C**	**2/2**	**0.63 - 0.63**	**2.8E+01**	**6.1E+00**	**2.9E-01 C**	**N/A**		**YES**	**ASL**
	7440-48-4	Cobalt	4.3E-01 J	7.9E-01 J	MG/KG	IR49-IS01D-7-8-09C	2/2	0.94 - 0.95	7.9E-01	8.2E-01	2.3E+00 N	N/A		NO	BSL
	7440-50-8	Copper	4.2E+00	4.3E+00	MG/KG	IR49-IS01D-7-8-09C	2/2	0.63 - 0.63	4.3E+00	4.8E+00	3.1E+02 N	7.0E+02		NO	BSL
	7439-89-6	**Iron**	**6.4E+03 J**	**1.8E+04 J**	**MG/KG**	**IR49-IS02-6-7-09C**	**2/2**	**6 - 6.3**	**1.8E+04**	**5.4E+03**	**5.5E+03 N**	**1.5E+02**		**YES**	**ASL**
	7439-92-1	Lead	1.4E+01	1.6E+01	MG/KG	IR49-IS01D-7-8-09C	2/2	0.189 - 0.189	1.6E+01	8.5E+00	4.0E+02	2.7E+02	NCSSL	NO	BSL
	7439-95-4	Magnesium	5.8E+02 J	7.0E+02 J	MG/KG	IR49-IS02-6-7-09C	2/2	315 - 315	7.0E+02	3.6E+02	N/A	N/A		NO	NUT
	7439-96-5	Manganese	6.9E+00	9.3E+00	MG/KG	IR49-IS01D-7-8-09C	2/2	0.94 - 0.95	9.3E+00	1.4E+01	1.8E+02 N	N/A		NO	BSL
	7439-97-6	Mercury	2.5E-02 J	2.5E-02 J	MG/KG	IR49-IS01D-7-8-09C	1/2	0.043 - 0.043	2.5E-02	7.1E-02	2.3E+00 N	1.0E+00	NCSSL	NO	BSL
	7440-02-0	Nickel	1.7E+00	2.1E+00 J	MG/KG	IR49-IS01D-7-8-09C	2/2	0.63 - 0.63	2.1E+00	2.3E+00	1.5E+02 N	1.3E+02	NCSSL	NO	BSL
	7440-09-7	Potassium	5.7E+02 J	6.6E+02 J	MG/KG	IR49-IS02-6-7-09C	2/2	315 - 315	6.6E+02	3.6E+02	N/A	N/A		NO	NUT
	7782-49-2	Selenium	2.4E-01 J	6.1E-01	MG/KG	IR49-IS02-6-7-09C	2/2	0.3 - 0.32	6.1E-01	5.1E-01	3.9E+01 N	2.1E+00	NCSSL	NO	BSL
	7440-22-4	Silver	ND	ND	MG/KG		0/2	0.597 - 0.631	6.3E-01	1.3E-01	3.9E+01 N	3.4E+00	NCSSL	NO	DLBSL
	7440-23-5	Sodium	2.8E+02 J	2.8E+02 J	MG/KG	IR49-IS02-6-7-09C	1/2	299 - 315	2.8E+02	8.1E+01	N/A	N/A		NO	NUT
	7440-28-0	Thallium	ND	ND	MG/KG		0/2	0.48 - 0.5	5.0E-01	3.8E-01	7.8E-02 N	N/A		YES	DLASL
	7440-62-2	**Vanadium**	**3.1E+01 J**	**4.1E+01 J**	**MG/KG**	**IR49-IS02-6-7-09C**	**2/2**	**0.9 - 0.95**	**4.1E+01**	**1.7E+01**	**3.9E+01 N**	**N/A**		**YES**	**ASL**
	7440-66-6	Zinc	6.7E+00	7.2E+00	MG/KG	IR49-IS01D-7-8-09C	2/2	1.3 - 1.3	7.2E+00	1.1E+01	2.3E+03 N	1.2E+03	NCSSL	NO	BSL

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TABLE 2.7

Occurrence, Distribution And Selection of Chemicals of Potential Concern

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection

* Surface soil & subsurface soil combined

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening. If not detected, maximum detection limit used for screening.

[3] Background values are lower of two times the arithmetic mean basewide background surface soil concentrations and two times the arithmetic mean basewide background subsurface soil concentrations.

[4] Oak Ridge National Laboratory (ORNL). June, 2011. Regional Screening Levels for Chemical Contaminants at Superfund Sites. [Online]. Adjusted (RSLs based on non-cancer (N) divided by 10) residential soil RSLs. Available: http://epa-prgs.ornl.gov/chemicals/index.shtml

RSL value for methoxychlor used as surrogate for 4-Chlorophenyl-phenylether.

RSL for n-hexane used as surrogate for methylcyclohexane.

RSL value for Nitrobenzene used as surrogate for 4-Nitrophenol.

RSL value for 2-nitroaniline used as surrogate for 3-nitroaniline.

RSL value for Acenaphthene used as surrogate for Acenaphthylene.

RSL value for pyrene used as surrogate for benzo(g,h,i)perylene.

RSL value for anthracene used as surrogate for phenanthrene.

RSL value for Chromium(VI) used as surrogate for chromium.

RSL value for Manganese (water) used as surrogate for manganese.

RSL value for Mercury (inorganic salts) used as surrogate for mercury.

RSL value for 1,3-dichloropropene used as a surrogate for cis-1,3-dichloropropene and trans-1,3-dichloropropene.

RSL value for 1,4-dichlorobenzene used as a surrogate for 1,3-dichlorobenzene.

RSL value for 2-chlorophenol used as surrogate for 2-nitrophenol.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)
Detection Limit Above Screening Level (DLASL), not quantitatively evaluated in HHRA

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)
Detection Limit Below Screening Level (DLBSL)

COPC = Chemical of Potential Concern

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered

J = Estimated Value

C = Carcinogenic

C* = N screening level < 100x C screening level, therefore C screening value used

C** = N screening level < 10x C screening level, therefore N screening value/10 used as screening level

N = Noncarcinogenic

S = noncarcinogenic based RSL higher than saturation concentration, therefore, soil saturation concentration used as screening level

NCSSL = North Carolina Soil Screening Levels (NCDENR, 2010)

N/A = Not applicable/not available

Appendix F
TABLE 2.8
Occurrence, Distribution And Selection of Chemicals of Potential Concern
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Emissions from	71-55-6	1,1,1-Trichloroethane	ND	ND	$\mu g/m^3$		0/22	--	2.0E-01	N/A	5.2E+02 N	N/A	N/A	NO	DLBSL
Soil*	79-34-5	1,1,2,2-Tetrachloroethane	4.7E-05 J	1.3E-04 J	$\mu g/m^3$	IR49-IS02-6-7-09C	4/22	--	1.3E-04	N/A	4.2E-02 C	N/A	N/A	NO	BSL
	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	ND	ND	$\mu g/m^3$		0/22	--	1.3E+00	N/A	3.1E+03 N	N/A	N/A	NO	DLBSL
	79-00-5	1,1,2-Trichloroethane	2.2E-04 J	2.2E-04 J	$\mu g/m^3$	IR49-SB09-3-4-11A	1/22	--	2.2E-04	N/A	2.1E-02 C**	N/A	N/A	NO	BSL
	75-34-3	1,1-Dichloroethane	ND	ND	$\mu g/m^3$		0/22	--	1.6E-01	N/A	1.5E+00 C	N/A	N/A	NO	DLBSL
	75-35-4	1,1-Dichloroethene	ND	ND	$\mu g/m^3$		0/22	--	2.9E-01	N/A	2.1E+01 N	N/A	N/A	NO	DLBSL
	120-82-1	1,2,4-Trichlorobenzene	ND	ND	$\mu g/m^3$		0/22	--	2.2E-02	N/A	2.1E-01 N	N/A	N/A	NO	DLBSL
	96-12-8	1,2-Dibromo-3-chloropropane	ND	ND	$\mu g/m^3$		0/22	--	5.4E-02	N/A	1.6E-04 C	N/A	N/A	YES	DLASL
	106-93-4	1,2-Dibromoethane	ND	ND	$\mu g/m^3$		0/22	--	3.9E-02	N/A	4.1E-03 C	N/A	N/A	YES	DLASL
	95-50-1	1,2-Dichlorobenzene	ND	ND	$\mu g/m^3$		0/22	--	2.9E-02	N/A	2.1E+01 N	N/A	N/A	NO	DLBSL
	78-87-5	1,2-Dichloropropane	ND	ND	$\mu g/m^3$		0/22	--	8.9E-02	N/A	2.4E-01 C*	N/A	N/A	NO	DLBSL
	541-73-1	1,3-Dichlorobenzene	ND	ND	$\mu g/m^3$		0/22	--	3.2E-02	N/A	2.2E-01 C	N/A	N/A	NO	DLBSL
	106-46-7	1,4-Dichlorobenzene	ND	ND	$\mu g/m^3$		0/22	--	3.2E-02	N/A	2.2E-01 C	N/A	N/A	NO	DLBSL
	78-93-3	2-Butanone	1.5E-04 J	3.8E-03 J	$\mu g/m^3$	IR49-SB13D-1_5-2-11A	6/18	--	3.8E-03	N/A	5.2E+02 N	N/A	N/A	NO	BSL
	591-78-6	2-Hexanone	ND	ND	$\mu g/m^3$		0/22	--	1.3E+00	N/A	3.1E+00 N	N/A	N/A	NO	DLBSL
	108-10-1	4-Methyl-2-pentanone	ND	ND	$\mu g/m^3$		0/22	--	1.6E+00	N/A	3.1E+02 N	N/A	N/A	NO	DLBSL
	67-64-1	Acetone	2.1E-03 J	1.3E-02 J	$\mu g/m^3$	IR49-SS07-11A	6/19	--	1.3E-02	N/A	3.2E+03 N	N/A	N/A	NO	BSL
	71-43-2	Benzene	4.2E-04 J	4.4E-04 J	$\mu g/m^3$	IR49-SS07-11A	2/22	--	4.4E-04	N/A	3.1E-01 C	N/A	N/A	NO	BSL
	75-27-4	Bromodichloromethane	ND	ND	$\mu g/m^3$		0/22	--	8.5E-02	N/A	6.6E-02 C	N/A	N/A	YES	DLASL
	75-25-2	Bromoform	ND	ND	$\mu g/m^3$		0/22	--	3.5E-02	N/A	2.2E+00 C	N/A	N/A	NO	DLBSL
	74-83-9	Bromomethane	ND	ND	$\mu g/m^3$		0/22	--	2.4E-01	N/A	5.2E-01 N	N/A	N/A	NO	DLBSL
	75-15-0	Carbon disulfide	1.5E-04 J	3.2E-02 J	$\mu g/m^3$	IR49-SS12-11A	14/22	--	3.2E-02	N/A	7.3E+01 N	N/A	N/A	NO	BSL
	56-23-5	Carbon tetrachloride	ND	ND	$\mu g/m^3$		0/22	--	2.2E-01	N/A	4.1E-01 C	N/A	N/A	NO	DLBSL
	108-90-7	Chlorobenzene	ND	ND	$\mu g/m^3$		0/22	--	5.2E-02	N/A	5.2E+00 N	N/A	N/A	NO	DLBSL
	75-00-3	Chloroethane	ND	ND	$\mu g/m^3$		0/22	--	2.6E-01	N/A	1.0E+03 N	N/A	N/A	NO	DLBSL
	67-66-3	Chloroform	ND	ND	$\mu g/m^3$		0/22	--	1.3E-01	N/A	1.1E-01 C	N/A	N/A	YES	DLASL
	74-87-3	Chloromethane	ND	ND	$\mu g/m^3$		0/22	--	2.9E-01	N/A	9.4E+00 N	N/A	N/A	NO	DLBSL
	156-59-2	cis-1,2-Dichloroethene	3.9E-04 J	3.9E-04 J	$\mu g/m^3$	IR49-IS02-6-7-09C	1/22	--	3.9E-04	N/A	6.3E+00 N	N/A	N/A	NO	BSL
	10061-01-5	cis-1,3-Dichloropropene	ND	ND	$\mu g/m^3$		0/22	--	9.5E-02	N/A	6.1E-01 C*	N/A	N/A	NO	DLBSL
	110-82-7	Cyclohexane	5.0E-04 J	7.7E-04 J	$\mu g/m^3$	IR49-SS07-11A	3/22	--	7.7E-04	N/A	6.3E+02 N	N/A	N/A	NO	BSL
	124-48-1	Dibromochloromethane	ND	ND	$\mu g/m^3$		0/22	--	4.2E-02	N/A	9.0E-02 C	N/A	N/A	NO	DLBSL
	75-71-8	Dichlorodifluoromethane (Freon-12)	ND	ND	$\mu g/m^3$		0/22	--	4.0E-01	N/A	1.0E+01 N	N/A	N/A	NO	DLBSL
	100-41-4	Ethylbenzene	1.1E-04 J	4.8E-04 J	$\mu g/m^3$	IR49-SB13-1_5-2-11A	3/22	--	4.8E-04	N/A	9.7E-01 C	N/A	N/A	NO	BSL

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TABLE 2.8
Occurrence, Distribution And Selection of Chemicals of Potential Concern
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
	98-82-8	Isopropylbenzene	ND	ND	$\mu g/m^3$		0/22	--	5.4E-02	N/A	4.2E+01 N	N/A	N/A	NO	DLBSL
	79-20-9	Methyl acetate	2.1E-04 J	5.0E-01 J	$\mu g/m^3$	IR49-SS12-11A	11/22	--	5.0E-01	N/A	N/A	N/A	N/A	NO	NTX
	108-87-2	Methylcyclohexane	1.3E-03 J	2.1E-03 J	$\mu g/m^3$	IR49-SS07-11A	3/22	--	2.1E-03	N/A	7.3E+01 N	N/A	N/A	NO	BSL
	75-09-2	Methylene chloride	2.0E-03 J	3.4E-02 J	$\mu g/m^3$	IR49-SS12D-11B	4/22	--	3.4E-02	N/A	5.2E+00 C	N/A	N/A	NO	BSL
	1634-04-4	Methyl-tert-butyl ether (MTBE)	ND	ND	$\mu g/m^3$		0/22	--	6.9E-02	N/A	9.4E+00 C	N/A	N/A	NO	DLBSL
	100-42-5	Styrene	ND	ND	$\mu g/m^3$		0/22	--	3.6E-02	N/A	1.0E+02 N	N/A	N/A	NO	DLBSL
	127-18-4	Tetrachloroethene	ND	ND	$\mu g/m^3$		0/22	--	1.4E-01	N/A	4.1E-01 C	N/A	N/A	NO	DLBSL
	108-88-3	Toluene	6.5E-05 J	5.9E-04 J	$\mu g/m^3$	IR49-SB13-1_5-2-11A	5/22	--	5.9E-04	N/A	5.2E+02 N	N/A	N/A	NO	BSL
	156-60-5	trans-1,2-Dichloroethene	ND	ND	$\mu g/m^3$		0/22	--	1.3E-01	N/A	6.3E+00 N	N/A	N/A	NO	DLBSL
	10061-02-6	trans-1,3-Dichloropropene	ND	ND	$\mu g/m^3$		0/22	--	9.5E-02	N/A	6.1E-01 C*	N/A	N/A	NO	DLBSL
	79-01-6	Trichloroethene	4.8E-04 J	1.7E-03 J	$\mu g/m^3$	IR49-SS07-11A	3/22	--	1.7E-03	N/A	1.0E+00 C**	N/A	N/A	NO	BSL
	75-69-4	Trichlorofluoromethane (Freon-11)	3.1E-02 J	3.1E-02 J	$\mu g/m^3$	IR49-SS03-11A	1/22	--	3.1E-02	N/A	7.3E+01 N	N/A	N/A	NO	BSL
	75-01-4	Vinyl chloride	ND	ND	$\mu g/m^3$		0/22	--	3.5E-01	N/A	1.6E-01 C	N/A	N/A	YES	DLASL
	1330-20-7	Xylene, total	6.7E-05 J	6.7E-05 J	$\mu g/m^3$	IR49-IS01-7-8-09C	1/22	--	6.7E-05	N/A	1.0E+01 N	N/A	N/A	NO	BSL
	92-52-4	1,1-Biphenyl	ND	ND	$\mu g/m^3$		0/2	--	1.9E-03	N/A	4.2E-02 N	N/A	N/A	NO	DLBSL
	108-60-1	2,2'-Oxybis(1-chloropropane)	ND	ND	$\mu g/m^3$		0/2	--	6.1E-03	N/A	2.4E-01 C	N/A	N/A	NO	DLBSL
	95-95-4	2,4,5-Trichlorophenol	ND	ND	$\mu g/m^3$		0/2	--	3.8E-07	N/A	N/A	N/A	N/A	NO	NTX
	88-06-2	2,4,6-Trichlorophenol	ND	ND	$\mu g/m^3$		0/2	--	1.9E-07	N/A	7.8E-01 C	N/A	N/A	NO	DLBSL
	120-83-2	2,4-Dichlorophenol	ND	ND	$\mu g/m^3$		0/2	--	1.9E-07	N/A	N/A	N/A	N/A	NO	NTX
	105-67-9	2,4-Dimethylphenol	ND	ND	$\mu g/m^3$		0/2	--	1.9E-07	N/A	N/A	N/A	N/A	NO	NTX
	51-28-5	2,4-Dinitrophenol	ND	ND	$\mu g/m^3$		0/2	--	3.8E-07	N/A	N/A	N/A	N/A	NO	NTX
	121-14-2	2,4-Dinitrotoluene	ND	ND	$\mu g/m^3$		0/2	--	1.9E-07	N/A	2.7E-02 C	N/A	N/A	NO	DLBSL
	606-20-2	2,6-Dinitrotoluene	ND	ND	$\mu g/m^3$		0/2	--	1.9E-07	N/A	N/A	N/A	N/A	NO	NTX
	91-58-7	2-Chloronaphthalene	ND	ND	$\mu g/m^3$		0/2	--	2.7E-03	N/A	N/A	N/A	N/A	NO	NTX
	95-57-8	2-Chlorophenol	ND	ND	$\mu g/m^3$		0/2	--	1.7E-03	N/A	N/A	N/A	N/A	NO	NTX
	91-57-6	2-Methylnaphthalene	ND	ND	$\mu g/m^3$		0/2	--	3.7E-03	N/A	N/A	N/A	N/A	NO	NTX
	95-48-7	2-Methylphenol	ND	ND	$\mu g/m^3$		0/2	--	1.9E-07	N/A	6.3E+01 N	N/A	N/A	NO	DLBSL
	88-74-4	2-Nitroaniline	ND	ND	$\mu g/m^3$		0/2	--	3.8E-07	N/A	5.2E-03 N	N/A	N/A	NO	DLBSL
	88-75-5	2-Nitrophenol	ND	ND	$\mu g/m^3$		0/2	--	1.9E-07	N/A	N/A	N/A	N/A	NO	NTX
	91-94-1	3,3'-Dichlorobenzidine	ND	ND	$\mu g/m^3$		0/2	--	1.9E-07	N/A	7.2E-03 C	N/A	N/A	NO	DLBSL
	99-09-2	3-Nitroaniline	ND	ND	$\mu g/m^3$		0/2	--	3.8E-07	N/A	5.2E-03 N	N/A	N/A	NO	DLBSL
	534-52-1	4,6-Dinitro-2-methylphenol	ND	ND	$\mu g/m^3$		0/2	--	3.8E-07	N/A	N/A	N/A	N/A	NO	NTX
	101-55-3	4-Bromophenyl-phenylether	ND	ND	$\mu g/m^3$		0/2	--	1.9E-07	N/A	N/A	N/A	N/A	NO	NTX
	59-50-7	4-Chloro-3-methylphenol	ND	ND	$\mu g/m^3$		0/2	--	1.9E-07	N/A	N/A	N/A	N/A	NO	NTX

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TABLE 2.8
Occurrence, Distribution And Selection of Chemicals of Potential Concern
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
	106-47-8	4-Chloroaniline	ND	ND	µg/m^3		0/2	--	1.9E-07	N/A	N/A	N/A	N/A	NO	NTX
	7005-72-3	4-Chlorophenyl-phenylether	ND	ND	µg/m^3		0/2	--	1.9E-07	N/A	N/A	N/A	N/A	NO	NTX
	106-44-5	4-Methylphenol	ND	ND	µg/m^3		0/2	--	1.9E-07	N/A	6.3E+01 N	N/A	N/A	NO	DLBSL
	100-01-6	4-Nitroaniline	ND	ND	µg/m^3		0/2	--	3.8E-07	N/A	6.3E-01 N	N/A	N/A	NO	DLBSL
	100-02-7	4-Nitrophenol	ND	ND	µg/m^3		0/2	--	3.8E-07	N/A	6.1E-02 C	N/A	N/A	NO	DLBSL
	83-32-9	Acenaphthene	ND	ND	µg/m^3		0/2	--	1.5E-03	N/A	N/A	N/A	N/A	NO	NTX
	208-96-8	Acenaphthylene	ND	ND	µg/m^3		0/2	--	1.9E-07	N/A	N/A	N/A	N/A	NO	NTX
	98-86-2	Acetophenone	ND	ND	µg/m^3		0/2	--	3.6E-03	N/A	N/A	N/A	N/A	NO	NTX
	120-12-7	Anthracene	ND	ND	µg/m^3		0/2	--	4.1E-04	N/A	N/A	N/A	N/A	NO	NTX
	1912-24-9	Atrazine	ND	ND	µg/m^3		0/2	--	1.9E-07	N/A	N/A	N/A	N/A	NO	NTX
	100-52-7	Benzaldehyde	ND	ND	µg/m^3		0/2	--	9.5E-03	N/A	N/A	N/A	N/A	NO	NTX
	56-55-3	Benzo(a)anthracene	ND	ND	µg/m^3		0/2	--	4.7E-08	N/A	8.7E-03 C	N/A	N/A	NO	DLBSL
	50-32-8	Benzo(a)pyrene	1.1E-09 J	1.1E-09 J	µg/m^3	IR49-IS02-6-7-09C	1/2	--	1.1E-09	N/A	8.7E-04 C	N/A	N/A	NO	BSL
	205-99-2	Benzo(b)fluoranthene	1.7E-09 J	1.7E-09 J	µg/m^3	IR49-IS02-6-7-09C	1/2	--	1.7E-09	N/A	8.7E-03 C	N/A	N/A	NO	BSL
	191-24-2	Benzo(g,h,i)perylene	ND	ND	µg/m^3		0/2	--	1.9E-07	N/A	N/A	N/A	N/A	NO	NTX
	207-08-9	Benzo(k)fluoranthene	ND	ND	µg/m^3		0/2	--	1.9E-07	N/A	8.7E-03 C	N/A	N/A	NO	DLBSL
	111-91-1	bis(2-Chloroethoxy)methane	ND	ND	µg/m^3		0/2	--	1.9E-07	N/A	N/A	N/A	N/A	NO	NTX
	111-44-4	bis(2-Chloroethyl)ether	ND	ND	µg/m^3		0/2	--	5.0E-03	N/A	7.4E-03 C	N/A	N/A	NO	DLBSL
	117-81-7	bis(2-Ethylhexyl)phthalate	ND	ND	µg/m^3		0/2	--	1.9E-07	N/A	1.0E+00 C	N/A	N/A	NO	DLBSL
	85-68-7	Butylbenzylphthalate	ND	ND	µg/m^3		0/2	--	1.9E-07	N/A	N/A	N/A	N/A	NO	NTX
	105-60-2	Caprolactam	1.2E-07 J	1.5E-07 J	µg/m^3	IR49-IS01-7-8-09C	2/2	--	1.5E-07	N/A	N/A	N/A	N/A	NO	NTX
	86-74-8	Carbazole	ND	ND	µg/m^3		0/2	--	1.9E-07	N/A	N/A	N/A	N/A	NO	NTX
	218-01-9	Chrysene	ND	ND	µg/m^3		0/2	--	1.9E-07	N/A	8.7E-02 C	N/A	N/A	NO	DLBSL
	53-70-3	Dibenz(a,h)anthracene	ND	ND	µg/m^3		0/2	--	5.1E-09	N/A	8.0E-04 C	N/A	N/A	NO	DLBSL
	132-64-9	Dibenzofuran	ND	ND	µg/m^3		0/2	--	1.1E-03	N/A	N/A	N/A	N/A	NO	NTX
	84-66-2	Diethylphthalate	ND	ND	µg/m^3		0/2	--	1.9E-07	N/A	N/A	N/A	N/A	NO	NTX
	131-11-3	Dimethyl phthalate	ND	ND	µg/m^3		0/2	--	1.9E-07	N/A	N/A	N/A	N/A	NO	NTX
	84-74-2	Di-n-butylphthalate	ND	ND	µg/m^3		0/2	--	1.9E-07	N/A	N/A	N/A	N/A	NO	NTX
	117-84-0	Di-n-octylphthalate	ND	ND	µg/m^3		0/2	--	3.2E-07	N/A	1.0E+00 C	N/A	N/A	NO	DLBSL
	206-44-0	Fluoranthene	ND	ND	µg/m^3		0/2	--	1.9E-07	N/A	N/A	N/A	N/A	NO	NTX
	86-73-7	Fluorene	ND	ND	µg/m^3		0/2	--	7.6E-04	N/A	N/A	N/A	N/A	NO	NTX
	118-74-1	Hexachlorobenzene	ND	ND	µg/m^3		0/2	--	1.9E-07	N/A	5.3E-03 C	N/A	N/A	NO	DLBSL
	87-68-3	Hexachlorobutadiene	ND	ND	µg/m^3		0/2	--	1.9E-07	N/A	1.1E-01 C	N/A	N/A	NO	DLBSL
	77-47-4	Hexachlorocyclopentadiene	ND	ND	µg/m^3		0/2	--	1.9E-07	N/A	2.1E-02 N	N/A	N/A	NO	DLBSL

Appendix F
TABLE 2.8
Occurrence, Distribution And Selection of Chemicals of Potential Concern
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
	67-72-1	Hexachloroethane	ND	ND	μg/m^3		0/2	--	1.9E-07	N/A	6.1E-01 C	N/A	N/A	NO	DLBSL
	193-39-5	Indeno(1,2,3-cd)pyrene	ND	ND	μg/m^3		0/2	--	4.7E-08	N/A	8.7E-03 C	N/A	N/A	NO	DLBSL
	78-59-1	Isophorone	ND	ND	μg/m^3		0/2	--	4.7E-08	N/A	2.1E+02 N	N/A	N/A	NO	DLBSL
	91-20-3	Naphthalene	ND	ND	μg/m^3		0/2	--	4.6E-03	N/A	7.2E-02 C*	N/A	N/A	NO	DLBSL
	621-64-7	n-Nitroso-di-n-propylamine	ND	ND	μg/m^3		0/2	--	2.4E-08	N/A	1.2E-03 C	N/A	N/A	NO	DLBSL
	86-30-6	n-Nitrosodiphenylamine	ND	ND	μg/m^3		0/2	--	1.9E-07	N/A	9.4E-01 C	N/A	N/A	NO	DLBSL
	98-95-3	Nitrobenzene	ND	ND	μg/m^3		0/2	--	2.9E-03	N/A	6.1E-02 C	N/A	N/A	NO	DLBSL
	87-86-5	Pentachlorophenol	ND	ND	μg/m^3		0/2	--	1.5E-08	N/A	4.8E-01 C	N/A	N/A	NO	DLBSL
	85-01-8	Phenanthrene	ND	ND	μg/m^3		0/2	--	1.9E-07	N/A	N/A	N/A	N/A	NO	NTX
	108-95-2	Phenol	ND	ND	μg/m^3		0/2	--	1.9E-07	N/A	2.1E+01 N	N/A	N/A	NO	DLBSL
	129-00-0	Pyrene	ND	ND	μg/m^3		0/2	--	9.0E-05	N/A	N/A	N/A	N/A	NO	NTX
	7429-90-5	Aluminum	1.2E-02	1.3E-02	μg/m^3	IR49-IS01D-7-8-09C	2/2	--	1.3E-02	N/A	N/A	N/A	N/A	NO	NTX
	7440-38-2	Arsenic	1.6E-06 J	5.2E-06 J	μg/m^3	IR49-IS02-6-7-09C	2/2	--	5.2E-06	N/A	5.7E-04 C*	N/A	N/A	NO	BSL
	7440-39-3	Barium	1.4E-05	2.0E-05	μg/m^3	IR49-IS01D-7-8-09C	2/2	--	2.0E-05	N/A	5.2E-02 N	N/A	N/A	NO	BSL
	7440-41-7	Beryllium	1.4E-07 J	1.5E-07 J	μg/m^3	IR49-IS01D-7-8-09C	2/2	--	1.5E-07	N/A	1.0E-03 C*	N/A	N/A	NO	BSL
	7440-43-9	Cadmium	ND	ND	μg/m^3		0/2	--	2.3E-07	N/A	1.4E-03 C*	N/A	N/A	NO	DLBSL
	7440-70-2	Calcium	8.0E-05 J	2.5E-04	μg/m^3	IR49-IS02-6-7-09C	2/2	--	2.5E-04	N/A	N/A	N/A	N/A	NO	NUT
	7440-47-3	**Chromium**	**1.6E-05 J**	**2.1E-05 J**	**μg/m^3**	**IR49-IS02-6-7-09C**	**2/2**	**--**	**2.1E-05**	**N/A**	**1.1E-05 C**	**N/A**	**N/A**	**YES**	**ASL**
	7440-48-4	Cobalt	3.3E-07 J	6.0E-07 J	μg/m^3	IR49-IS01D-7-8-09C	2/2	--	6.0E-07	N/A	2.7E-04 C*	N/A	N/A	NO	BSL
	7440-50-8	Copper	3.2E-06	3.3E-06	μg/m^3	IR49-IS01D-7-8-09C	2/2	--	3.3E-06	N/A	N/A	N/A	N/A	NO	NTX
	7439-89-6	Iron	4.9E-03 J	1.4E-02 J	μg/m^3	IR49-IS02-6-7-09C	2/2	--	1.4E-02	N/A	N/A	N/A	N/A	NO	NTX
	7439-92-1	Lead	1.0E-05	1.2E-05	μg/m^3	IR49-IS01D-7-8-09C	2/2	--	1.2E-05	N/A	N/A	N/A	N/A	NO	NTX
	7439-95-4	Magnesium	4.4E-04 J	5.3E-04 J	μg/m^3	IR49-IS02-6-7-09C	2/2	--	5.3E-04	N/A	N/A	N/A	N/A	NO	NUT
	7439-96-5	Manganese	5.2E-06	7.0E-06	μg/m^3	IR49-IS01D-7-8-09C	2/2	--	7.0E-06	N/A	5.2E-03 N	N/A	N/A	NO	BSL
	7439-97-6	Mercury	1.9E-08 J	1.9E-08 J	μg/m^3	IR49-IS01D-7-8-09C	1/2	--	1.9E-08	N/A	3.1E-03 N	N/A	N/A	NO	BSL
	7440-02-0	Nickel	1.3E-06	1.6E-06 J	μg/m^3	IR49-IS01D-7-8-09C	2/2	--	1.6E-06	N/A	9.4E-03 C*	N/A	N/A	NO	BSL
	7440-09-7	Potassium	4.3E-04 J	5.0E-04 J	μg/m^3	IR49-IS02-6-7-09C	2/2	--	5.0E-04	N/A	N/A	N/A	N/A	NO	NUT
	7782-49-2	Selenium	1.8E-07 J	4.6E-07	μg/m^3	IR49-IS02-6-7-09C	2/2	--	4.6E-07	N/A	2.1E+00 N	N/A	N/A	NO	BSL
	7440-22-4	Silver	ND	ND	μg/m^3		0/2	--	6.3E-01	N/A	N/A	N/A	N/A	NO	NTX
	7440-23-5	Sodium	2.1E-04 J	2.1E-04 J	μg/m^3	IR49-IS02-6-7-09C	1/2	--	2.1E-04	N/A	N/A	N/A	N/A	NO	NUT
	7440-28-0	Thallium	ND	ND	μg/m^3		0/2	--	5.0E-01	N/A	N/A	N/A	N/A	NO	NTX
	7440-62-2	Vanadium	2.3E-05 J	3.1E-05 J	μg/m^3	IR49-IS02-6-7-09C	2/2	--	3.1E-05	N/A	N/A	N/A	N/A	NO	NTX
	7440-66-6	Zinc	5.1E-06	5.5E-06	μg/m^3	IR49-IS01D-7-8-09C	2/2	--	5.5E-06	N/A	N/A	N/A	N/A	NO	NTX

Appendix F
TABLE 2.8
Occurrence, Distribution And Selection of Chemicals of Potential Concern
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection

[1] Minimum/Maximum calculated air concentrations from surface soil concentrations. Air concentrations calculated as $C_{air} = C_{soil}*1000*(1/PEF + 1/VF)$.
PEF = 1.36E+09 m^3/kg. VF calculated for volatile constituents only, on Table 2.2A. PEF and VF from USEPA's Soil Screening Guidance. (USEPA, July 1996)
[2] Maximum concentration is used for screening. If ND, maximum detection limit used for screening.
[3] Background values not available.
[4] USEPA, June 2011. Regional Screening Levels for Chemical Contaminants at Superfund Sites. Adjusted Residential Ambient Air RSL. RSLs based on non-cancer (N) divided by
Available: http://epa-prgs.ornl.gov/chemicals/index.shtml
RSL value for methoxychlor used as surrogate for 4-Chlorophenyl-phenylether.
RSL for n-hexane used as surrogate for methylcyclohexane.
RSL value for Nitrobenzene used as surrogate for 4-Nitrophenol.
RSL value for 2-nitroaniline used as surrogate for 3-nitroaniline.
RSL value for Acenaphthene used as surrogate for Acenaphthylene.
RSL value for pyrene used as surrogate for benzo(g,h,i)perylene.
RSL value for anthracene used as surrogate for phenanthrene.
RSL value for Chromium(VI) used as surrogate for chromium.
RSL value for Manganese (water) used as surrogate for manganese.
RSL value for Mercury (inorganic salts) used as surrogate for mercury.
RSL value for 1,3-dichloropropene used as a surrogate for cis-1,3-dichloropropene and trans-1,3-dichloropropene.
RSL value for 1,4-dichlorobenzene used as a surrogate for 1,3-dichlorobenzene.
RSL value for 2-chlorophenol used as surrogate for 2-nitrophenol.
[5] Rationale Codes
Selection Reason: Above Screening Levels (ASL)
Detection Limit Above Screening Level (DLASL), not quantitatively evaluated in HHRA
Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)
Detection Limit Below Screening Level (DLBSL)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/
To Be Considered
J = Estimated Value
C = Carcinogenic
C* = N screening level < 100x C screening level, therefore
C screening value used
C** = N screening level < 10x C screening level, therefore
N screening value/10 used as screening level
N = Noncarcinogenic
N/A = Not applicable/not available

Appendix F

TABLE 2.9

Occurrence, Distribution And Selection of Chemicals of Potential Concern

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Groundwater	71-55-6	1,1,1-Trichloroethane	ND	ND	UG/L		0/15	1 - 1	1.0E+00	N/A	9.1E+02 N	2.0E+02	MCL, NC2LGW	NO	DLBSL
	79-34-5	**1,1,2,2-Tetrachloroethane**	**8.6E-01 J**	**7.9E+01**	**UG/L**	**IR49-TW07-10A**	**5/15**	**1 - 1**	**7.9E+01**	**N/A**	**6.7E-02 C**	**2.0E-01**	**NC2LGW**	**YES**	**ASL**
	76-13-1	(Freon-113)	ND	ND	UG/L		0/15	1 - 1	1.0E+00	N/A	5.9E+03 N	2.0E+05	NC2LGW	NO	DLBSL
	79-00-5	**1,1,2-Trichloroethane**	**3.7E-01 J**	**6.0E+00**	**UG/L**	**IR49-TW07-10A**	**5/15**	**1 - 1**	**6.0E+00**	**N/A**	**4.2E-02 C****	**5.0E+00**	**MCL**	**YES**	**ASL**
	75-34-3	1,1-Dichloroethane	ND	ND	UG/L		0/15	1 - 1	1.0E+00	N/A	2.4E+00 C	6.0E+00	NC2LGW	NO	DLBSL
	75-35-4	1,1-Dichloroethene	3.9E-01 J	9.9E-01 J	UG/L	IR49-TW07-10A	3/15	1 - 1	9.9E-01	N/A	3.4E+01 N	7.0E+00	MCL, NC2LGW	NO	BSL
	120-82-1	1,2,4-Trichlorobenzene	ND	ND	UG/L		0/15	1 - 2	2.0E+00	N/A	4.1E-01 C**	7.0E+01	MCL, NC2LGW	YES	DLASL
	96-12-8	1,2-Dibromo-3-chloropropane	ND	ND	UG/L		0/15	1 - 2	2.0E+00	N/A	3.2E-04 C	2.0E-01	MCL	YES	DLASL
												4.0E-02	NC2LGW		
	106-93-4	1,2-Dibromoethane	ND	ND	UG/L		0/15	1 - 1	1.0E+00	N/A	6.5E-03 C	5.0E-02	MCL	YES	DLASL
												2.0E-02	NC2LGW		
	95-50-1	1,2-Dichlorobenzene	ND	ND	UG/L		0/15	1 - 1	1.0E+00	N/A	3.7E+01 N	6.0E+02	MCL	NO	DLBSL
												2.0E+01	NC2LGW		
	107-06-2	**1,2-Dichloroethane**	**3.5E-01 J**	**6.2E-01 J**	**UG/L**	**IR49-TW06-10A**	**4/15**	**1 - 1**	**6.2E-01**	**N/A**	**1.5E-01 C***	**5.0E+00**	**MCL, NC2LGW**	**YES**	**ASL**
	78-87-5	1,2-Dichloropropane	ND	ND	UG/L		0/15	1 - 1	1.0E+00	N/A	3.9E-01 C*	5.0E+00	MCL	YES	DLASL
												6.0E-01	NC2LGW		
	541-73-1	1,3-Dichlorobenzene	ND	ND	UG/L		0/15	1 - 1	1.0E+00	N/A	4.3E-01 C	2.0E+02	NC2LGW	YES	DLASL
	106-46-7	1,4-Dichlorobenzene	2.6E-01 J	3.0E-01 J	UG/L	IR49-TW05-10A	3/15	1 - 1	3.0E-01	N/A	4.3E-01 C	7.5E+01	MCL	NO	BSL
												6.0E+00	NC2LGW		
	78-93-3	2-Butanone	ND	ND	UG/L		0/15	3 - 5	5.0E+00	N/A	7.1E+02 N	4.0E+03	NC2LGW	NO	DLBSL
	591-78-6	2-Hexanone	ND	ND	UG/L		0/15	1 - 5	5.0E+00	N/A	4.7E+00 N	2.8E+02	NC2LGW	YES	DLASL
	108-10-1	4-Methyl-2-pentanone	ND	ND	UG/L		0/15	1 - 5	5.0E+00	N/A	2.0E+02 N	N/A	N/A	NO	DLBSL
	67-64-1	Acetone	2.6E+00 J	6.1E+00	UG/L	IR49-TW08-10A	3/15	2.5 - 10	6.1E+00	N/A	2.2E+03 N	6.0E+03	NC2LGW	NO	BSL
	71-43-2	**Benzene**	**1.9E-01 J**	**2.5E+00**	**UG/L**	**IR49-TW07-10A**	**4/15**	**1 - 1**	**2.5E+00**	**N/A**	**4.1E-01 C**	**1.0E+00**	**NC2LGW**	**YES**	**ASL**
												5.0E+00	**MCL**		
	75-27-4	Bromodichloromethane	ND	ND	UG/L		0/15	1 - 1	1.0E+00	N/A	1.2E-01 C	6.0E-01	NC2LGW	YES	DLASL
												8.0E+01	MCL		
	75-25-2	Bromoform	ND	ND	UG/L		0/15	1 - 1.5	1.5E+00	N/A	8.5E+00 C*	4.0E+00	NC2LGW	NO	DLBSL
												8.0E+01	MCL		
	74-83-9	Bromomethane	ND	ND	UG/L		0/15	1 - 1	1.0E+00	N/A	8.7E-01 N	N/A	N/A	YES	DLASL
	75-15-0	Carbon disulfide	2.1E-01 J	2.1E-01 J	UG/L	IR49-TW01D-09C	1/15	1 - 5	2.1E-01	N/A	1.0E+02 N	7.0E+02	NC2LGW	NO	BSL
	56-23-5	Carbon tetrachloride	ND	ND	UG/L		0/15	1 - 1	1.0E+00	N/A	4.4E-01 C	5.0E+00	MCL	YES	DLASL
												3.0E-01	NC2LGW		
	108-90-7	Chlorobenzene	ND	ND	UG/L		0/15	1 - 1	1.0E+00	N/A	9.1E+00 N	1.0E+02	MCL	NO	DLBSL
												5.0E+01	NC2LGW		
	75-00-3	Chloroethane	ND	ND	UG/L		0/15	1 - 1	1.0E+00	N/A	2.1E+03 N	3.0E+03	NC2LGW	NO	DLBSL
	67-66-3	**Chloroform**	**2.5E-01 J**	**5.5E-01 J**	**UG/L**	**IR49-GW03-11A**	**5/15**	**1 - 1**	**5.5E-01**	**N/A**	**1.9E-01 C**	**8.0E+01**	**MCL**	**YES**	**ASL**
												7.0E+01	**NC2LGW**		

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TABLE 2.9

Occurrence, Distribution And Selection of Chemicals of Potential Concern

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
	74-87-3	Chloromethane	ND	ND	UG/L		0/15	1 - 1	1.0E+00	N/A	1.9E+01 N	3.0E+00	NC2LGW	NO	DLBSL
	156-59-2	**cis-1,2-Dichloroethene**	**3.1E-01 J**	**1.6E+02**	**UG/L**	**IR49-TW07-10A**	**13/15**	**1 - 1.5**	**1.6E+02**	**N/A**	**7.3E+00 N**	**7.0E+01**	**MCL, NC2LGW**	**YES**	**ASL**
	10061-01-5	cis-1,3-Dichloropropene	ND	ND	UG/L		0/15	1 - 1	1.0E+00	N/A	4.3E-01 C*	4.0E-01	NC2LGW	YES	DLASL
	110-82-7	Cyclohexane	3.1E-01 J	3.5E+00	UG/L	IR49-TW07-10A	3/15	1 - 5	3.5E+00	N/A	1.3E+03 N	N/A	N/A	NO	BSL
	124-48-1	Dibromochloromethane	ND	ND	UG/L		0/15	1 - 1	1.0E+00	N/A	1.5E-01 C	8.0E+01	MCL	YES	DLASL
												4.0E-01	NC2LGW		
	75-71-8	Dichlorodifluoromethane (Freon-12)	ND	ND	UG/L		0/15	1 - 1	1.0E+00	N/A	2.0E+01 N	1.0E+03	NC2LGW	NO	DLBSL
	100-41-4	Ethylbenzene	1.3E-01 J	1.8E-01 J	UG/L	IR49-TW07-10A	3/15	1 - 1	1.8E-01	N/A	1.5E+00 C	7.0E+02	MCL	NO	BSL
												6.0E+02	NC2LGW		
	98-82-8	Isopropylbenzene	2.0E-01 J	5.2E-01 J	UG/L	IR49-TW07-10A	4/15	1 - 1	5.2E-01	N/A	6.8E+01 N	7.0E+01	NC2LGW	NO	BSL
	79-20-9	Methyl acetate	ND	ND	UG/L		0/15	1 - 5	5.0E+00	N/A	3.7E+03 N	N/A	N/A	NO	DLBSL
	108-87-2	Methylcyclohexane	2.7E+00	5.9E+00	UG/L	IR49-TW07-10A	3/15	1 - 5	5.9E+00	N/A	8.8E+01 N	N/A	N/A	NO	DLBSL
	75-09-2	Methylene chloride	ND	ND	UG/L		0/15	1 - 1	1.0E+00	N/A	4.8E+00 C	5.0E+00	MCL, NC2LGW	NO	DLBSL
	1634-04-4	Methyl-tert-butyl ether (MTBE)	ND	ND	UG/L		0/15	1 - 1	1.0E+00	N/A	1.2E+01 C	2.0E+02	NC2LGW	NO	DLBSL
	100-42-5	Styrene	ND	ND	UG/L		0/15	1 - 1	1.0E+00	N/A	1.6E+02 N	1.0E+02	MCL	NO	DLBSL
												7.0E+01	NC2LGW		
	127-18-4	**Tetrachloroethene**	**5.0E-01 J**	**1.3E+00**	**UG/L**	**IR49-TW07-10A**	**3/15**	**1 - 1**	**1.3E+00**	**N/A**	**1.1E-01 C**	**5.0E+00**	**MCL**	**YES**	**ASL**
												7.0E-01	**NC2LGW**		
	108-88-3	Toluene	1.0E-01 J	2.8E-01 J	UG/L	IR49-GW01-11A	2/15	1 - 1	2.8E-01	N/A	2.3E+02 N	1.0E+03	MCL	NO	BSL
												6.0E+02	NC2LGW		
	156-60-5	**trans-1,2-Dichloroethene**	**6.6E-01 J**	**1.1E+02**	**UG/L**	**IR49-TW07-10A**	**8/15**	**1 - 1.5**	**1.1E+02**	**N/A**	**1.1E+01 N**	**1.0E+02**	**MCL, NC2LGW**	**YES**	**ASL**
	10061-02-6	trans-1,3-Dichloropropene	ND	ND	UG/L		0/15	1 - 1	1.0E+00	N/A	4.3E-01 C*	4.0E-01	NC2LGW	YES	DLASL
	79-01-6	**Trichloroethene**	**2.8E-01 J**	**2.8E+02**	**UG/L**	**IR49-TW07-10A**	**6/15**	**1 - 3**	**2.8E+02**	**N/A**	**2.0E+00 C***	**5.0E+00**	**MCL**	**YES**	**ASL**
												3.0E+00	**NC2LGW**		
	75-69-4	Trichlorofluoromethane (Freon-11)	ND	ND	UG/L		0/15	1 - 1	1.0E+00	N/A	1.3E+02 N	2.0E+03	15A NCAC 2L	NO	DLBSL
	75-01-4	**Vinyl chloride**	**9.3E-01 J**	**2.2E+01**	**UG/L**	**IR49-TW06-10A**	**6/15**	**1 - 1**	**2.2E+01**	**N/A**	**1.6E-02 C**	**2.0E+00**	**MCL**	**YES**	**ASL**
												3.0E-02	**NC2LGW**		
	1330-20-7	Xylene, total	ND	ND	UG/L		0/15	1 - 3	3.0E+00	N/A	2.0E+01 N	1.0E+04	MCL	NO	DLBSL
												5.0E+02	NC2LGW		
	92-52-4	1,1-Biphenyl	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	8.3E-02 N	4.0E+02	NC2LGW	YES	DLASL
	108-60-1	2,2'-Oxybis(1-chloropropane)	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	3.2E-01 C	N/A	N/A	YES	DLASL
	95-95-4	2,4,5-Trichlorophenol	ND	ND	UG/L		0/1	23 - 24	2.4E+01	N/A	3.7E+02 N	N/A	N/A	NO	DLBSL
	88-06-2	2,4,6-Trichlorophenol	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	3.7E+00 C**	N/A	N/A	YES	DLASL
	120-83-2	2,4-Dichlorophenol	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	1.1E+01 N	N/A	N/A	NO	DLBSL
	105-67-9	2,4-Dimethylphenol	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	7.3E+01 N	1.0E+02	NC2LGW	NO	DLBSL
	51-28-5	2,4-Dinitrophenol	ND	ND	UG/L		0/1	23 - 24	2.4E+01	N/A	7.3E+00 N	N/A	N/A	YES	DLASL
	121-14-2	2,4-Dinitrotoluene	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	2.2E-01 C	N/A	N/A	YES	DLASL
	606-20-2	2,6-Dinitrotoluene	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	3.7E+00 N	N/A	N/A	YES	DLASL

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TABLE 2.9

Occurrence, Distribution And Selection of Chemicals of Potential Concern

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
	91-58-7	2-Chloronaphthalene	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	2.9E+02 N	N/A	N/A	NO	DLBSL
	95-57-8	2-Chlorophenol	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	1.8E+01 N	4.0E-01	NC2LGW	NO	DLBSL
	91-57-6	2-Methylnaphthalene	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	1.5E+01 N	3.0E+01	NC2LGW	NO	DLBSL
	95-48-7	2-Methylphenol	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	1.8E+02 N	N/A	N/A	NO	DLBSL
	88-74-4	2-Nitroaniline	ND	ND	UG/L		0/1	23 - 24	2.4E+01	N/A	3.7E+01 N	N/A	N/A	NO	DLBSL
	88-75-5	2-Nitrophenol	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	1.8E+01 N	N/A	N/A	NO	DLBSL
	91-94-1	3,3'-Dichlorobenzidine	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	1.5E-01 C	N/A	N/A	YES	DLASL
	99-09-2	3-Nitroaniline	ND	ND	UG/L		0/1	23 - 24	2.4E+01	N/A	3.7E+01 N	N/A	N/A	NO	DLBSL
	534-52-1	4,6-Dinitro-2-methylphenol	ND	ND	UG/L		0/1	23 - 24	2.4E+01	N/A	2.9E-01 N	N/A	N/A	YES	DLASL
	101-55-3	4-Bromophenyl-phenylether	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	N/A	N/A	N/A	NO	DLBSL
	59-50-7	4-Chloro-3-methylphenol	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	3.7E+02 N	N/A	N/A	NO	DLBSL
	106-47-8	4-Chloroaniline	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	3.4E-01 C	N/A	N/A	YES	DLASL
	7005-72-3	4-Chlorophenyl-phenylether	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	1.8E+01 N	N/A	N/A	NO	DLBSL
	106-44-5	4-Methylphenol	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	1.8E+01 N	4.0E+01	NC2LGW	NO	DLBSL
	100-01-6	4-Nitroaniline	ND	ND	UG/L		0/1	23 - 24	2.4E+01	N/A	3.4E+00 C*	N/A	N/A	YES	DLASL
	100-02-7	4-Nitrophenol	ND	ND	UG/L		0/1	23 - 24	2.4E+01	N/A	1.2E-01 C	N/A	N/A	YES	DLASL
	83-32-9	Acenaphthene	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	2.2E+02 N	8.0E+01	NC2LGW	NO	DLBSL
	208-96-8	Acenaphthylene	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	2.2E+02 N	2.0E+02	NC2LGW	NO	DLBSL
	98-86-2	Acetophenone	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	3.7E+02 N	N/A	N/A	NO	DLBSL
	120-12-7	Anthracene	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	1.1E+03 N	2.0E+03	NC2LGW	NO	DLBSL
	1912-24-9	Atrazine	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	2.9E-01 C	3.0E+00	MCL, NC2LGW	YES	DLASL
	100-52-7	Benzaldehyde	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	3.7E+02 N	N/A	N/A	NO	DLBSL
	56-55-3	Benzo(a)anthracene	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	2.9E-02 C	5.0E-02	NC2LGW	YES	DLASL
	50-32-8	Benzo(a)pyrene	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	2.9E-03 C	2.0E-01	MCL	YES	DLASL
												5.0E-03	NC2LGW		
	205-99-2	Benzo(b)fluoranthene	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	2.9E-02 C	5.0E-02	NC2LGW	YES	DLASL
	191-24-2	Benzo(g,h,i)perylene	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	1.1E+02 N	2.0E+02	NC2LGW	NO	DLBSL
	207-08-9	Benzo(k)fluoranthene	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	2.9E-01 C	5.0E-01	NC2LGW	YES	DLASL
	111-91-1	bis(2-Chloroethoxy)methane	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	1.1E+01 N	N/A	N/A	NO	DLBSL
	111-44-4	bis(2-Chloroethyl)ether	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	1.2E-02 C	3.0E-02	NC2LGW	YES	DLASL
	117-81-7	bis(2-Ethylhexyl)phthalate	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	4.8E+00 C	6.0E+00	MCL	YES	DLASL
												3.0E+00	NC2LGW		
	85-68-7	Butylbenzylphthalate	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	3.5E+01 C	1.0E+03	NC2LGW	NO	DLBSL
	105-60-2	Caprolactam	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	1.8E+03 N	4.0E+03	NC2LGW	NO	DLBSL
	86-74-8	Carbazole	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	N/A	N/A	N/A	NO	DLBSL
	218-01-9	Chrysene	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	2.9E+00 C	5.0E+00	NC2LGW	YES	DLASL
	53-70-3	Dibenz(a,h)anthracene	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	2.9E-03 C	5.0E-03	NC2LGW	YES	DLASL
	132-64-9	Dibenzofuran	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	3.7E+00 N	N/A	N/A	YES	DLASL

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TABLE 2.9

Occurrence, Distribution And Selection of Chemicals of Potential Concern

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
	84-66-2	Diethylphthalate	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	2.9E+03 N	6.0E+03	NC2LGW	NO	DLBSL
	131-11-3	Dimethyl phthalate	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	N/A	N/A	N/A	NO	DLBSL
	84-74-2	Di-n-butylphthalate	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	3.7E+02 N	7.0E+02	NC2LGW	NO	DLBSL
	117-84-0	Di-n-octylphthalate	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	4.8E+00 C	1.0E+02	NC2LGW	YES	DLASL
	206-44-0	Fluoranthene	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	1.5E+02 N	3.0E+02	NC2LGW	NO	DLBSL
	86-73-7	Fluorene	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	1.5E+02 N	3.0E+02	NC2LGW	NO	DLBSL
	118-74-1	Hexachlorobenzene	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	4.2E-02 C	1.0E+00	MCL	YES	DLASL
												2.0E-02	NC2LGW		
	87-68-3	Hexachlorobutadiene	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	8.6E-01 C*	4.0E-01	NC2LGW	YES	DLASL
	77-47-4	Hexachlorocyclopentadiene	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	2.2E+01 N	5.0E+01	MCL	NO	DLBSL
	67-72-1	Hexachloroethane	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	3.7E+00 C**	N/A	N/A	YES	DLASL
	193-39-5	Indeno(1,2,3-cd)pyrene	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	2.9E-02 C	5.0E-02	NC2LGW	YES	DLASL
	78-59-1	Isophorone	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	7.1E+01 C	4.0E+01	NC2LGW	NO	DLBSL
	91-20-3	Naphthalene	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	1.4E-01 C*	6.0E+00	NC2LGW	YES	DLASL
	621-64-7	n-Nitroso-di-n-propylamine	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	9.6E-03 C	N/A	N/A	YES	DLASL
	86-30-6	n-Nitrosodiphenylamine	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	1.4E+01 C	N/A	N/A	NO	DLBSL
	98-95-3	Nitrobenzene	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	1.2E-01 C	N/A	N/A	YES	DLASL
	87-86-5	Pentachlorophenol	ND	ND	UG/L		0/1	23 - 24	2.4E+01	N/A	1.7E-01 C	1.0E+00	MCL	YES	DLASL
												3.0E-01	NC2LGW		
	85-01-8	Phenanthrene	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	1.1E+03 N	2.0E+02	NC2LGW	NO	DLBSL
	108-95-2	Phenol	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	1.1E+03 N	3.0E+01	NC2LGW	NO	DLBSL
	129-00-0	Pyrene	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	1.1E+02 N	2.0E+02	NC2LGW	NO	DLBSL
	7429-90-5	Aluminum	1.1E+03 J	1.1E+03 J	UG/L	IR49-TW01-09C	1/1	200 - 200	1.1E+03	1.9E+03	3.7E+03 N	N/A	N/A	NO	BSL
	7440-36-0	Antimony	ND	ND	UG/L		0/1	15 - 15	1.5E+01	3.3E+00	1.5E+00 N	6.0E+00	MCL	YES	DLASL
	7440-38-2	Arsenic	ND	ND	UG/L		0/1	10 - 10	1.0E+01	5.8E+00	4.5E-02 C	1.0E+01	MCL, NC2LGW	YES	DLASL
	7440-39-3	Barium	3.9E+01 J	3.9E+01 J	UG/L	IR49-TW01D-09C	1/1	40 - 40	3.9E+01	8.6E+01	7.3E+02 N	2.0E+03	MCL, NC2LGW	NO	BSL
	7440-41-7	Beryllium	ND	ND	UG/L		0/1	5 - 5	5.0E+00	3.1E-01	7.3E+00 N	4.0E+00	MCL	NO	DLBSL
	7440-43-9	Cadmium	ND	ND	UG/L		0/1	5 - 5	5.0E+00	3.6E-01	1.8E+00 N	2.0E+00	NC2LGW	YES	DLASL
												5.0E+00	MCL		
	7440-70-2	Calcium	1.2E+04 J	1.2E+04 J	UG/L	IR49-TW01D-09C	1/1	5000 - 5000	1.2E+04	6.9E+04	N/A	N/A	N/A	NO	NUT
	7440-47-3	Chromium	2.5E+00 J	2.5E+00 J	UG/L	IR49-TW01-09C	1/1	10 - 10	2.5E+00	3.1E+00	4.3E-02 C	1.0E+02	MCL	NO	BBK
												1.0E+01	NC2LGW		
	7440-48-4	Cobalt	ND	ND	UG/L		0/1	15 - 15	1.5E+01	3.4E+00	1.1E+00 N	N/A	N/A	YES	DLASL
	7440-50-8	Copper	ND	ND	UG/L		0/1	10 - 10	1.0E+01	2.8E+00	1.5E+02 N	1.3E+03	MCL	NO	DLBSL
												1.0E+03	NC2LGW		
	7439-89-6	Iron	4.0E+03	4.0E+03	UG/L	IR49-TW01-09C	1/1	100 - 100	4.0E+03	6.0E+03	2.6E+03 N	3.0E+02	NC2LGW	NO	BBK
	7439-92-1	Lead	ND	ND	UG/L		0/1	3 - 3	3.0E+00	2.8E+00	N/A	1.5E+01	MCL, NC2LGW	NO	DLBSL
	7439-95-4	Magnesium	2.0E+03 J	2.0E+03 J	UG/L	9-TW01-09C : IR49-TW01D-(	1/1	5000 - 5000	2.0E+03	6.4E+03	N/A	N/A	N/A	NO	NUT

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TABLE 2.9

Occurrence, Distribution And Selection of Chemicals of Potential Concern

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
	7439-96-5	Manganese	5.2E+01	5.2E+01	UG/L	IR49-TW01D-09C	1/1	15 - 15	5.2E+01	2.1E+02	8.8E+01 N	5.0E+01	NC2LGW	NO	BSL
	7439-97-6	Mercury	ND	ND	UG/L		0/1	0.2 - 0.2	2.0E-01	1.0E-01	1.1E+00 N	2.0E+00	MCL	NO	DLBSL
												1.0E+00	NC2LGW		
	7440-02-0	Nickel	1.4E+01	1.4E+01	UG/L	IR49-TW01D-09C	1/1	10 - 10	1.4E+01	8.0E+00	7.3E+01 N	1.0E+02	NC2LGW	NO	BSL
	7440-09-7	Potassium	1.1E+03 J	1.1E+03 J	UG/L	IR49-TW01D-09C	1/1	5000 - 5000	1.1E+03	3.3E+03	N/A	N/A	N/A	NO	NUT
	7782-49-2	Selenium	ND	ND	UG/L		0/1	5 - 5	5.0E+00	3.1E+00	1.8E+01 N	5.0E+01	MCL	NO	DLBSL
												2.0E+01	NC2LGW		
	7440-22-4	Silver	ND	ND	UG/L		0/1	10 - 10	1.0E+01	7.7E-01	1.8E+01 N	2.0E+01	NC2LGW	NO	DLBSL
	7440-23-5	Sodium	3.2E+04 J	3.2E+04 J	UG/L	IR49-TW01D-09C	1/1	5000 - 5000	3.2E+04	2.3E+04	N/A	N/A	N/A	NO	NUT
	7440-28-0	Thallium	ND	ND	UG/L		0/1	2 - 2	2.0E+00	3.8E+00	3.7E-02 N	2.0E+00	MCL	YES	DLASL
	7440-62-2	Vanadium	ND	ND	UG/L		0/1	15 - 15	1.5E+01	4.7E+00	1.8E+01 N	N/A	N/A	NO	DLBSL
	7440-66-6	Zinc	1.1E+01 J	1.1E+01 J	UG/L	IR49-TW01D-09C	1/1	25 - 25	1.1E+01	4.2E+01	1.1E+03 N	1.0E+02	NC2LGW	NO	BSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening. If not detected, maximum detection limit used for screening.

[3] Background values are two times the arithmetic mean basewide background shallow groundwater concentrations.
Background values are from *Final Base Background Soil Study Report, Marine Corps Base Camp Lejeune, North Carolina* , Baker Environmental, April 25, 2001.

[4] Oak Ridge National Laboratory (ORNL). June, 2011. Regional Screening Levels for Chemical Contaminants at Superfund Sites. [Online].
Available: http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm
Adjusted (RSLs based on non-cancer (N) divided by 10) tap water RSLs.
RSL for n-hexane used as surrogate for methylcyclohexane.
RSL value for methoxychlor used as surrogate for 4-Chlorophenyl-phenylether.
RSL value for Nitrobenzene used as surrogate for 4-Nitrophenol.
RSL value for 2-nitroaniline used as surrogate for 3-nitroaniline.
RSL value for Acenaphthene used as surrogate for Acenaphthylene.
RSL value for pyrene used as surrogate for benzo(g,h,i)perylene.
RSL value for anthracene used as surrogate for phenanthrene.
RSL value for Chromium(VI) used as surrogate for chromium.
RSL value for Manganese (water) used as surrogate for manganese.
RSL value for Mercury (inorganic salts) used as surrogate for mercury.
RSL value for 1,4-dichlorobenzene used as a surrogate for 1,3-dichlorobenzene.
RSL value for 1,3-dichloropropene used as a surrogate for cis-1,3-dichloropropene and trans-1,3-dichloropropene.
RSL value for 2-chlorophenol used as surrogate for 2-nitrophenol.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)
Detection Limit Above Screening Level (DLASL), not quantitatively evaluated in HHRA

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)
Below Background (BBK)
Detection Limit Below Screening Level (DLBSL)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
C = Carcinogenic
C* = N screening level < 100x C screening level, therefore C screening value used
C** = N screening level < 10x C screening level, therefore N screening value/10 used as screening level
N = Noncarcinogenic
MCL = Maximum Contaminant Level from EPA's National Primary Drinking Water Standards
NC2LGW = North Carolina Classifications and Groundwater Quality Standards, January, 2010.

Appendix F

TABLE 2.9

Occurrence, Distribution And Selection of Chemicals of Potential Concern

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Tap Water and	71-55-6	1,1,1-Trichloroethane	ND	ND	UG/L		0/15	1 - 1	1.0E+00	N/A	9.1E+02 N	2.0E+02	MCL, NC2LGW	NO	DLBSL
Water in	**79-34-5**	**1,1,2,2-Tetrachloroethane**	**8.6E-01 J**	**7.9E+01**	**UG/L**	**IR49-TW07-10A**	**5/15**	**1 - 1**	**7.9E+01**	**N/A**	**6.7E-02 C**	**2.0E-01**	**NC2LGW**	**YES**	**ASL**
Excavation Pit	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	ND	ND	UG/L		0/15	1 - 1	1.0E+00	N/A	5.9E+03 N	2.0E+05	NC2LGW	NO	DLBSL
	79-00-5	**1,1,2-Trichloroethane**	**3.7E-01 J**	**6.0E+00**	**UG/L**	**IR49-TW07-10A**	**5/15**	**1 - 1**	**6.0E+00**	**N/A**	**4.2E-02 C****	**5.0E+00**	**MCL**	**YES**	**ASL**
	75-34-3	1,1-Dichloroethane	ND	ND	UG/L		0/15	1 - 1	1.0E+00	N/A	2.4E+00 C	6.0E+00	NC2LGW	NO	DLBSL
	75-35-4	1,1-Dichloroethene	3.9E-01 J	9.9E-01 J	UG/L	IR49-TW07-10A	3/15	1 - 1	9.9E-01	N/A	3.4E+01 N	7.0E+00	MCL, NC2LGW	NO	BSL
	120-82-1	1,2,4-Trichlorobenzene	ND	ND	UG/L		0/15	1 - 2	2.0E+00	N/A	4.1E-01 C**	7.0E+01	MCL, NC2LGW	YES	DLASL
	96-12-8	1,2-Dibromo-3-chloropropane	ND	ND	UG/L		0/15	1 - 2	2.0E+00	N/A	3.2E-04 C	2.0E-01	MCL	YES	DLASL
												4.0E-02	NC2LGW		
	106-93-4	1,2-Dibromoethane	ND	ND	UG/L		0/15	1 - 1	1.0E+00	N/A	6.5E-03 C	5.0E-02	MCL	YES	DLASL
												2.0E-02	NC2LGW		
	95-50-1	1,2-Dichlorobenzene	ND	ND	UG/L		0/15	1 - 1	1.0E+00	N/A	3.7E+01 N	6.0E+02	MCL	NO	DLBSL
												2.0E+01	NC2LGW		
	107-06-2	**1,2-Dichloroethane**	**3.5E-01 J**	**6.2E-01 J**	**UG/L**	**IR49-TW06-10A**	**4/15**	**1 - 1**	**6.2E-01**	**N/A**	**1.5E-01 C***	**5.0E+00**	**MCL, NC2LGW**	**YES**	**ASL**
	78-87-5	1,2-Dichloropropane	ND	ND	UG/L		0/15	1 - 1	1.0E+00	N/A	3.9E-01 C*	5.0E+00	MCL	YES	DLASL
												6.0E-01	NC2LGW		
	541-73-1	1,3-Dichlorobenzene	ND	ND	UG/L		0/15	1 - 1	1.0E+00	N/A	4.3E-01 C	2.0E+02	NC2LGW	YES	DLASL
	106-46-7	1,4-Dichlorobenzene	2.6E-01 J	3.0E-01 J	UG/L	IR49-TW05-10A	3/15	1 - 1	3.0E-01	N/A	4.3E-01 C	7.5E+01	MCL	NO	BSL
												6.0E+00	NC2LGW		
	78-93-3	2-Butanone	ND	ND	UG/L		0/15	3 - 5	5.0E+00	N/A	7.1E+02 N	4.0E+03	NC2LGW	NO	DLBSL
	591-78-6	2-Hexanone	ND	ND	UG/L		0/15	1 - 5	5.0E+00	N/A	4.7E+00 N	2.8E+02	NC2LGW	YES	DLASL
	108-10-1	4-Methyl-2-pentanone	ND	ND	UG/L		0/15	1 - 5	5.0E+00	N/A	2.0E+02 N	N/A	N/A	NO	DLBSL
	67-64-1	Acetone	2.6E+00 J	6.1E+00	UG/L	IR49-TW08-10A	3/15	2.5 - 10	6.1E+00	N/A	2.2E+03 N	6.0E+03	NC2LGW	NO	BSL
	71-43-2	**Benzene**	**1.9E-01 J**	**2.5E+00**	**UG/L**	**IR49-TW07-10A**	**4/15**	**1 - 1**	**2.5E+00**	**N/A**	**4.1E-01 C**	**1.0E+00**	**NC2LGW**	**YES**	**ASL**
												5.0E+00	**MCL**		
	75-27-4	Bromodichloromethane	ND	ND	UG/L		0/15	1 - 1	1.0E+00	N/A	1.2E-01 C	6.0E-01	NC2LGW	YES	DLASL
												8.0E+01	MCL		
	75-25-2	Bromoform	ND	ND	UG/L		0/15	1 - 1.5	1.5E+00	N/A	8.5E+00 C*	4.0E+00	NC2LGW	NO	DLBSL
												8.0E+01	MCL		
	74-83-9	Bromomethane	ND	ND	UG/L		0/15	1 - 1	1.0E+00	N/A	8.7E-01 N	N/A	N/A	YES	DLASL
	75-15-0	Carbon disulfide	2.1E-01 J	2.1E-01 J	UG/L	IR49-TW01D-09C	1/15	1 - 5	2.1E-01	N/A	1.0E+02 N	7.0E+02	NC2LGW	NO	BSL
	56-23-5	Carbon tetrachloride	ND	ND	UG/L		0/15	1 - 1	1.0E+00	N/A	4.4E-01 C	5.0E+00	MCL	YES	DLASL
												3.0E-01	NC2LGW		
	108-90-7	Chlorobenzene	ND	ND	UG/L		0/15	1 - 1	1.0E+00	N/A	9.1E+00 N	1.0E+02	MCL	NO	DLBSL
												5.0E+01	NC2LGW		
	75-00-3	Chloroethane	ND	ND	UG/L		0/15	1 - 1	1.0E+00	N/A	2.1E+03 N	3.0E+03	NC2LGW	NO	DLBSL
	67-66-3	**Chloroform**	**2.5E-01 J**	**5.5E-01 J**	**UG/L**	**IR49-GW03-11A**	**5/15**	**1 - 1**	**5.5E-01**	**N/A**	**1.9E-01 C**	**8.0E+01**	**MCL**	**YES**	**ASL**
												7.0E+01	**NC2LGW**		

Appendix F

TABLE 2.9

Occurrence, Distribution And Selection of Chemicals of Potential Concern

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
	74-87-3	Chloromethane	ND	ND	UG/L		0/15	1 - 1	1.0E+00	N/A	1.9E+01 N	3.0E+00	NC2LGW	NO	DLBSL
	156-59-2	**cis-1,2-Dichloroethene**	**3.1E-01 J**	**1.6E+02**	**UG/L**	**IR49-TW07-10A**	**13/15**	**1 - 1.5**	**1.6E+02**	**N/A**	**7.3E+00 N**	**7.0E+01**	**MCL, NC2LGW**	**YES**	**ASL**
	10061-01-5	cis-1,3-Dichloropropene	ND	ND	UG/L		0/15	1 - 1	1.0E+00	N/A	4.3E-01 C*	4.0E-01	NC2LGW	YES	DLASL
	110-82-7	Cyclohexane	3.1E-01 J	3.5E+00	UG/L	IR49-TW07-10A	3/15	1 - 5	3.5E+00	N/A	1.3E+03 N	N/A	N/A	NO	BSL
	124-48-1	Dibromochloromethane	ND	ND	UG/L		0/15	1 - 1	1.0E+00	N/A	1.5E-01 C	8.0E+01	MCL	YES	DLASL
												4.0E-01	NC2LGW		
	75-71-8	Dichlorodifluoromethane (Freon-12)	ND	ND	UG/L		0/15	1 - 1	1.0E+00	N/A	2.0E+01 N	1.0E+03	NC2LGW	NO	DLBSL
	100-41-4	Ethylbenzene	1.3E-01 J	1.8E-01 J	UG/L	IR49-TW07-10A	3/15	1 - 1	1.8E-01	N/A	1.5E+00 C	7.0E+02	MCL	NO	BSL
												6.0E+02	NC2LGW		
	98-82-8	Isopropylbenzene	2.0E-01 J	5.2E-01 J	UG/L	IR49-TW07-10A	4/15	1 - 1	5.2E-01	N/A	6.8E+01 N	7.0E+01	NC2LGW	NO	BSL
	79-20-9	Methyl acetate	ND	ND	UG/L		0/15	1 - 5	5.0E+00	N/A	3.7E+03 N	N/A	N/A	NO	DLBSL
	108-87-2	Methylcyclohexane	2.7E+00	5.9E+00	UG/L	IR49-TW07-10A	3/15	1 - 5	5.9E+00	N/A	8.8E+01 N	N/A	N/A	NO	BSL
	75-09-2	Methylene chloride	ND	ND	UG/L		0/15	1 - 1	1.0E+00	N/A	4.8E+00 C	5.0E+00	MCL, NC2LGW	NO	DLBSL
	1634-04-4	Methyl-tert-butyl ether (MTBE)	ND	ND	UG/L		0/15	1 - 1	1.0E+00	N/A	1.2E+01 C	2.0E+02	NC2LGW	NO	DLBSL
	100-42-5	Styrene	ND	ND	UG/L		0/15	1 - 1	1.0E+00	N/A	1.6E+02 N	1.0E+02	MCL	NO	DLBSL
												7.0E+01	NC2LGW		
	127-18-4	**Tetrachloroethene**	**5.0E-01 J**	**1.3E+00**	**UG/L**	**IR49-TW07-10A**	**3/15**	**1 - 1**	**1.3E+00**	**N/A**	**1.1E-01 C**	**5.0E+00**	**MCL**	**YES**	**ASL**
												7.0E-01	**NC2LGW**		
	108-88-3	Toluene	1.0E-01 J	2.8E-01 J	UG/L	IR49-GW01-11A	2/15	1 - 1	2.8E-01	N/A	2.3E+02 N	1.0E+03	MCL	NO	BSL
												6.0E+02	NC2LGW		
	156-60-5	**trans-1,2-Dichloroethene**	**6.6E-01 J**	**1.1E+02**	**UG/L**	**IR49-TW07-10A**	**8/15**	**1 - 1.5**	**1.1E+02**	**N/A**	**1.1E+01 N**	**1.0E+02**	**MCL, NC2LGW**	**YES**	**ASL**
	10061-02-6	trans-1,3-Dichloropropene	ND	ND	UG/L		0/15	1 - 1	1.0E+00	N/A	4.3E-01 C*	4.0E-01	NC2LGW	YES	DLASL
	79-01-6	**Trichloroethene**	**2.8E-01 J**	**2.8E+02**	**UG/L**	**IR49-TW07-10A**	**6/15**	**1 - 3**	**2.8E+02**	**N/A**	**2.0E+00 C***	**5.0E+00**	**MCL**	**YES**	**ASL**
												3.0E+00	**NC2LGW**		
	75-69-4	Trichlorofluoromethane (Freon-11)	ND	ND	UG/L		0/15	1 - 1	1.0E+00	N/A	1.3E+02 N	2.0E+03	NC2LGW	NO	DLBSL
	75-01-4	**Vinyl chloride**	**9.3E-01 J**	**2.2E+01**	**UG/L**	**IR49-TW06-10A**	**6/15**	**1 - 1**	**2.2E+01**	**N/A**	**1.6E-02 C**	**2.0E+00**	**MCL**	**YES**	**ASL**
												3.0E-02	**NC2LGW**		
	1330-20-7	Xylene, total	ND	ND	UG/L		0/15	1 - 3	3.0E+00	N/A	2.0E+01 N	1.0E+04	MCL	NO	DLBSL
												5.0E+02	NC2LGW		
	92-52-4	1,1-Biphenyl	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	8.3E-02 N	4.0E+02	NC2LGW	YES	DLASL
	108-60-1	2,2'-Oxybis(1-chloropropane)	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	3.2E-01 C	N/A	N/A	YES	DLASL
	91-58-7	2-Chloronaphthalene	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	2.9E+02 N	N/A	N/A	NO	DLBSL
	95-57-8	2-Chlorophenol	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	1.8E+01 N	4.0E-01	NC2LGW	NO	DLBSL
	91-57-6	2-Methylnaphthalene	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	1.5E+01 N	3.0E+01	NC2LGW	NO	DLBSL
	83-32-9	Acenaphthene	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	2.2E+02 N	8.0E+01	NC2LGW	NO	DLBSL
	98-86-2	Acetophenone	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	3.7E+02 N	N/A	N/A	NO	DLBSL
	120-12-7	Anthracene	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	1.1E+03 N	2.0E+03	NC2LGW	NO	DLBSL
	100-52-7	Benzaldehyde	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	3.7E+02 N	N/A	N/A	NO	DLBSL
	111-44-4	bis(2-Chloroethyl)ether	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	1.2E-02 C	3.0E-02	NC2LGW	YES	DLASL
	132-64-9	Dibenzofuran	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	3.7E+00 N	N/A	N/A	YES	DLASL
	86-73-7	Fluorene	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	1.5E+02 N	3.0E+02	NC2LGW	NO	DLBSL
	91-20-3	Naphthalene	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	1.4E-01 C*	6.0E+00	NC2LGW	YES	DLASL

Appendix F

TABLE 2.9

Occurrence, Distribution And Selection of Chemicals of Potential Concern

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
	98-95-3	Nitrobenzene	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	1.2E-01 C	N/A	N/A	YES	DLASL
	129-00-0	Pyrene	ND	ND	UG/L		0/1	9.4 - 9.8	9.8E+00	N/A	1.1E+02 N	2.0E+02	NC2LGW	NO	DLBSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening. If not detected, maximum detection limit used for screening.

[3] Background values not available.

[4] Oak Ridge National Laboratory (ORNL). June, 2011. Regional Screening Levels for Chemical Contaminants at Superfund Sites. [Online].
Available: http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm
Adjusted (RSLs based on non-cancer (N) divided by 10) tap water RSLs.
RSL for n-hexane used as surrogate for methylcyclohexane.
RSL value for 1,4-dichlorobenzene used as a surrogate for 1,3-dichlorobenzene.
RSL value for 1,3-dichloropropene used as a surrogate for cis-1,3-dichloropropene and trans-1,3-dichloropropene.
Rationale Codes

Selection Reason: Above Screening Levels (ASL)
Detection Limit Above Screening Level (DLASL), not quantitatively evaluated in HHRA

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)
Detection Limit Below Screening Level (DLBSL)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
C = Carcinogenic
C* = N screening level < 100x C screening level, therefore C screening value used
C** = N screening level < 10x C screening level, therefore N screening value/10 used as screening level
N = Noncarcinogenic
MCL = Maximum Contaminant Level from EPA's National Primary Drinking Water Standards
NC2LGW = North Carolina Classifications and Groundwater Quality Standards, January, 2010.

Appendix F

TABLE 2.10

Occurrence, Distribution And Selection of Chemicals of Potential Concern

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air (Residential)

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Groundwater into Indoor Air	**79-34-5**	**1,1,2,2-Tetrachloroethane**	**8.6E-01 J**	**7.9E+01**	**UG/L**	**IR49-TW07-10A**	**5/15**	**1 - 1**	**7.9E+01**	**N/A**	**4.6E+00 C**	**2.0E-01**	**NC2LGW**	**YES**	**ASL**
	79-00-5	**1,1,2-Trichloroethane**	**3.7E-01 J**	**6.0E+00**	**UG/L**	**IR49-TW07-10A**	**5/15**	**1 - 1**	**6.0E+00**	**N/A**	**9.8E-01 N**	**5.0E+00**	**MCL**	**YES**	**ASL**
	75-35-4	1,1-Dichloroethene	3.9E-01 J	9.9E-01 J	UG/L	IR49-TW07-10A	3/15	1 - 1	9.9E-01	N/A	**2.5E+01 N**	7.0E+00	MCL, NC2LGW	NO	BSL
	107-06-2	1,2-Dichloroethane	3.5E-01 J	6.2E-01 J	UG/L	IR49-TW06-10A	4/15	1 - 1	6.2E-01	N/A	2.8E+00 C	5.0E+00	MCL, NC2LGW	NO	BSL
	106-46-7	1,4-Dichlorobenzene	2.6E-01 J	3.0E-01 J	UG/L	IR49-TW05-10A	3/15	1 - 1	3.0E-01	N/A	**3.8E+00 C**	7.5E+01	MCL	NO	BSL
	67-64-1	Acetone	2.6E+00 J	6.1E+00	UG/L	IR49-TW08-10A	3/15	2.5 - 10	6.1E+00	N/A	**3.2E+06 N**	6.0E+03	NC2LGW	NO	BSL
	71-43-2	**Benzene**	**1.9E-01 J**	**2.5E+00**	**UG/L**	**IR49-TW07-10A**	**4/15**	**1 - 1**	**2.5E+00**	**N/A**	**2.0E+00 C**	**1.0E+00**	**NC2LGW**	**YES**	**ASL**
	75-15-0	Carbon disulfide	2.1E-01 J	2.1E-01 J	UG/L	IR49-TW01D-09C	1/15	1 - 5	2.1E-01	N/A	**1.6E+02 N**	7.0E+02	NC2LGW	NO	BSL
	67-66-3	Chloroform	2.5E-01 J	5.5E-01 J	UG/L	IR49-GW03-11A	5/15	1 - 1	5.5E-01	N/A	1.0E+00 C	8.0E+01	MCL	NO	BSL
	156-59-2	**cis-1,2-Dichloroethene**	**3.1E-01 J**	**1.6E+02**	**UG/L**	**IR49-TW07-10A**	**13/15**	**1 - 1.5**	**1.6E+02**	**N/A**	**4.1E+01 N**	**7.0E+01**	**MCL, NC2LGW**	**YES**	**ASL**
	110-82-7	Cyclohexane	3.1E-01 J	3.5E+00	UG/L	IR49-TW07-10A	3/15	1 - 5	3.5E+00	N/A	**N/A**	N/A	N/A	NO	NTX
	100-41-4	Ethylbenzene	1.3E-01 J	1.8E-01 J	UG/L	IR49-TW07-10A	3/15	1 - 1	1.8E-01	N/A	**4.9E+00 C**	7.0E+02	MCL	NO	BSL
	98-82-8	Isopropylbenzene	2.0E-01 J	5.2E-01 J	UG/L	IR49-TW07-10A	4/15	1 - 1	5.2E-01	N/A	**1.6E+02 N**	7.0E+01	NC2LGW	NO	BSL
	108-87-2	**Methylcyclohexane**	**2.7E+00**	**5.9E+00**	**UG/L**	**IR49-TW07-10A**	**3/15**	**1 - 5**	**5.9E+00**	**N/A**	**1.2E+00 N**	**N/A**	**N/A**	**YES**	**ASL**
	127-18-4	**Tetrachloroethene**	**5.0E-01 J**	**1.3E+00**	**UG/L**	**IR49-TW07-10A**	**3/15**	**1 - 1**	**1.3E+00**	**N/A**	**8.5E-01 C**	**5.0E+00**	**MCL**	**YES**	**ASL**
	108-88-3	Toluene	1.0E-01 J	2.8E-01 J	UG/L	IR49-GW01-11A	2/15	1 - 1	2.8E-01	N/A	**3.0E+03 N**	1.0E+03	MCL	NO	BSL
	156-60-5	**trans-1,2-Dichloroethene**	**6.6E-01 J**	**1.1E+02**	**UG/L**	**IR49-TW07-10A**	**8/15**	**1 - 1.5**	**1.1E+02**	**N/A**	**5.1E+01 N**	**1.0E+02**	**MCL, NC2LGW**	**YES**	**ASL**
	79-01-6	**Trichloroethene**	**2.8E-01 J**	**2.8E+02**	**UG/L**	**IR49-TW07-10A**	**6/15**	**1 - 3**	**2.8E+02**	**N/A**	**3.7E+00 N**	**5.0E+00**	**MCL**	**YES**	**ASL**
	75-01-4	**Vinyl chloride**	**9.3E-01 J**	**2.2E+01**	**UG/L**	**IR49-TW06-10A**	**6/15**	**1 - 1**	**2.2E+01**	**N/A**	**1.7E-01 C**	**2.0E+00**	**MCL**	**YES**	**ASL**

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values are two times the arithmetic mean basewide background shallow groundwater concentrations.
Background values are from *Final Base Background Soil Study Report, Marine Corps Base Camp Lejeune, North Carolina* , Baker Environmental, April 25, 2001.

[4] Vapor Intrusion Groundwater Screening Levels. See Table 2.10 Supplement A
Adjusted (RSLs based on non-cancer (N) divided by 10) residential air RSLs.
RSL for n-hexane used as surrogate for methylcyclohexane.
RSL value for 1,4-dichlorobenzene used as a surrogate for 1,3-dichlorobenzene.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)
Detection Limit Above Screening Level (DLASL), not quantitatively evaluated in HHRA

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)
Below Background (BBK)
Detection Limit Below Screening Level (DLBSL)

COPC = Chemical of Potential Concern

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/
To Be Considered

J = Estimated Value

C = Carcinogenic

N = Noncarcinogenic

MCL = Maximum Contaminant Level from EPA's National Primary Drinking Water Standards

NC2LGW = North Carolina Classifications and Groundwater Quality Standards,

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TABLE 2.10 Supplement A
Development of Target Groundwater Concentrations for Protection of Residential Air
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Parameter	Symbol	Value
Henry's Law Constant	H	chem-specific
Empirical Attenuation Factor	alpha	1.0E-03

CAS	Chemical	Cancer based Concentration in Indoor Air ($\mu g/m^3$) (1)	Non-cancer based Concentration in Indoor Air ($\mu g/m^3$) (1)	Target Concentration in Indoor Air ($\mu g/m^3$) (1)	key	Concentration in Soil Gas ($\mu g/m^3$)	Henry's Law Constant (2)	Target Concentration in Groundwater ($\mu g/m^3$)	Target Concentration in Groundwater (µg/L)
79-34-5	1,1,2,2-Tetrachloroethane	4.20E-02		4.20E-02	ca	4.20E+01	9.06E-03	4.64E+03	4.64E+00
79-00-5	1,1,2-Trichloroethane	1.50E-01	2.10E-02	2.10E-02	nc	2.10E+01	2.14E-02	9.82E+02	9.82E-01
75-35-4	1,1-Dichloroethene		2.10E+01	2.10E+01	nc	2.10E+04	8.24E-01	2.55E+04	2.55E+01
107-06-2	1,2-Dichloroethane	9.40E-02	7.30E-01	9.40E-02	ca	9.40E+01	3.41E-02	2.76E+03	2.76E+00
106-46-7	1,4-Dichlorobenzene	2.20E-01	8.30E+01	2.20E-01	ca	2.20E+02	5.74E-02	3.83E+03	3.83E+00
67-64-1	Acetone		3.20E+03	3.20E+03	nc	3.20E+06	1.01E-03	3.18E+09	3.18E+06
71-43-2	Benzene	3.10E-01	3.10E+00	3.10E-01	ca	3.10E+02	1.55E-01	2.00E+03	2.00E+00
75-15-0	Carbon disulfide		7.30E+01	7.30E+01	nc	7.30E+04	4.49E-01	1.63E+05	1.63E+02
67-66-3	Chloroform	1.10E-01	1.00E+01	1.10E-01	ca	1.10E+02	1.10E-01	9.99E+02	9.99E-01
156-59-2	cis-1,2-Dichloroethene			6.30E+00	nc	6.30E+03	1.21E-01	4.11E+04	4.11E+01
110-82-7	Cyclohexane		6.30E+02	6.30E+02	nc	6.30E+05	N/A	N/A	N/A
100-41-4	Ethylbenzene	9.70E-01	1.00E+02	9.70E-01	ca	9.70E+02	1.98E-01	4.89E+03	4.89E+00
98-82-8	Isopropylbenzene		4.20E+01	4.20E+01	nc	4.20E+04	2.55E-01	1.64E+05	1.64E+02
108-87-2	Methylcyclohexane		7.30E+01	7.30E+01	nc	7.30E+04	6.27E+01	1.16E+03	1.16E+00
127-18-4	Tetrachloroethene	4.10E-01	2.80E+01	4.10E-01	ca	4.10E+02	4.85E-01	8.45E+02	8.45E-01
108-88-3	Toluene		5.20E+02	5.20E+02	nc	5.20E+05	1.76E-01	2.96E+06	2.96E+03
156-60-5	trans-1,2-Dichloroethene		6.30E+00	6.30E+00	nc	6.30E+03	1.25E-01	5.05E+04	5.05E+01
79-01-6	Trichloroethene	1.20E+00	1.00E+00	1.00E+00	nc	1.00E+03	2.69E-01	3.71E+03	3.71E+00
75-01-4	Vinyl chloride	1.60E-01	1.00E+01	1.60E-01	ca	1.60E+02	9.36E-01	1.71E+02	1.71E-01

(1) Concentration in indoor air based on USEPA Residential Indoor Air RSL (based on ELCR = $1x10^{-6}$ or HI = 0.1).
(2) Dimensionless Henry's Law Constant at System Temperature

C_{gw} [µg/L] = $C_{target,ia}$ (µg/m^3) * 10 $^{-3}$ m^3/L * 1/H'$_{TS}$ *1/α
where,

C_{gw} Target groundwater concentration (i.e., GWSL),
$C_{target,ia}$ Target indoor air concentration (i.e., RSLs for residential air),
α Attenuation factor ([AF] default ratio of indoor air concentration to source vapor concentration; 1 x 10^{-3}), and
H'$_{TS}$ Henry's law constant at system (groundwater) temperature (dimensionless)

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TABLE 2.10 Supplement B

Calculation of Temperature Specific Henry's Law Constants

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Parameter	Symbol	Value	
System Temperature (deg K)	TS	2.89E+02	
Groundwater Temperature (deg C)		1.63E+01	site average
Gas Constant (cal/mole-K)	R_C	1.99E+00	
Gas Constant (atm-m^3/mole-K)	R	8.21E-05	

Chemical	CAS#	CAS#	Henry's Law Constant at Reference Temperature (atm-m^3/mole)	Enthalpy of Vaporization at the Normal Boiling Point (cal/mole)	Normal Boiling Point (deg K)	Normal Critical Temperature (deg K)	Reference Temperature T_R (deg K)	T_B/T_C	Value of Exponent n as a function of T_B/T_C	Enthalpy of Vaporization at the System Temperature (cal/mole)	Dimensionless Henry's Law Constant at System Temperature
1,1,2,2-Tetrachloroethane	79345	79-34-5	3.67E-04	9.00E+03	4.20E+02	6.61E+02	2.98E+02	6.35E-01	3.54E-01	1.05E+04	9.06E-03
1,1,2-Trichloroethane	79005	79-00-5	8.24E-04	8.32E+03	3.86E+02	6.02E+02	2.98E+02	6.41E-01	3.59E-01	9.50E+03	2.14E-02
1,1-Dichloroethene	75354	75-35-4	2.61E-02	6.25E+03	3.05E+02	5.76E+02	2.97E+02	5.29E-01	3.00E-01	6.35E+03	8.24E-01
1,2-Dichloroethane	75343	107-06-2	1.18E-03	6.90E+03	3.31E+02	5.23E+02	2.98E+02	6.32E-01	3.52E-01	7.38E+03	3.41E-02
1,4-Dichlorobenzene	106467	106-46-7	2.41E-03	9.27E+03	4.47E+02	6.85E+02	2.98E+02	6.53E-01	3.67E-01	1.12E+04	5.74E-02
Acetone	67641	67-64-1	3.50E-05	6.96E+03	3.29E+02	5.08E+02	2.98E+02	6.48E-01	3.63E-01	7.48E+03	1.01E-03
Benzene	71432	71-43-2	5.55E-03	7.34E+03	3.53E+02	5.62E+02	2.98E+02	6.28E-01	3.49E-01	8.06E+03	1.55E-01
Carbon disulfide	75150	75-15-0	1.44E-02	6.39E+03	3.19E+02	5.52E+02	2.97E+02	5.78E-01	3.12E-01	6.63E+03	4.49E-01
Chloroform	67663	67-66-3	3.67E-03	6.99E+03	3.34E+02	5.36E+02	2.97E+02	6.23E-01	3.45E-01	7.49E+03	1.10E-01
cis-1,2-Dichloroethene	156592	156-59-2	4.08E-03	7.19E+03	3.34E+02	5.44E+02	2.97E+02	6.13E-01	3.38E-01	7.67E+03	1.21E-01
Cyclohexane	110827	110-82-7	1.50E-01	N/A	N/A	N/A	2.98E+02	N/A	4.10E-01	N/A	N/A
Ethylbenzene	100414	100-41-4	7.88E-03	8.50E+03	4.09E+02	6.17E+02	2.98E+02	6.63E-01	3.75E-01	1.01E+04	1.98E-01
Isopropylbenzene	98828	98-82-8	1.15E-02	1.03E+04	4.26E+02	6.31E+02	2.98E+02	6.74E-01	3.83E-01	1.26E+04	2.55E-01
Methylcyclohexane	108872	108-87-2	1.80E+00	7.47E+03	3.74E+02	5.72E+02	2.93E+02	6.53E-01	3.68E-01	8.51E+03	6.27E+01
Tetrachloroethene	127184	127-18-4	1.77E-02	8.29E+03	3.94E+02	6.20E+02	2.97E+02	6.36E-01	3.55E-01	9.49E+03	4.85E-01
Toluene	108883	108-88-3	6.64E-03	7.93E+03	3.84E+02	5.92E+02	2.98E+02	6.49E-01	3.64E-01	9.09E+03	1.76E-01
trans-1,2-Dichloroethene	156605	156-60-5	4.08E-03	6.72E+03	3.21E+02	5.17E+02	2.97E+02	6.21E-01	3.44E-01	7.07E+03	1.25E-01
Trichloroethene	79016	79-01-6	9.85E-03	7.51E+03	3.60E+02	5.44E+02	2.98E+02	6.62E-01	3.74E-01	8.48E+03	2.69E-01
Vinyl chloride	75014	75-01-4	2.78E-02	5.25E+03	2.59E+02	4.32E+02	2.97E+02	6.00E-01	3.28E-01	4.93E+03	9.36E-01

Physical and chemical properties were obtained from the Johnson and Ettinger Model Vlookup Sheet (EPA, 2004) except for Henry's Law Constant and reference temperature.
References for Henry's Law Constants are presented on Table 1.
Chemical and physical properties of 'Cumene' were used to represent 'p-Cymene (p-Isopropyltoluene)'.

Dimensionless Henry's law constant at the system temperature:

$$H'_{TS} = \frac{\exp\left[-\frac{\Delta H_{v,TS}}{R_c T_s}\left(\frac{1}{T_S} - \frac{1}{T_R}\right)\right] H_R}{R T_S}$$

where,

H'TS = Henry's law constant at the system temperature (dimensionless)
ΔHv,TS = Enthalpy of vaporization at the system temperature (cal/mol)
TS = System temperature (°K)
TR = Henry's law constant reference temperature (°K)
HR = Henry's law constant at the reference temperature (atm-m3/mol)
Rc = Gas constant (= 1.9872 cal/mol - °K)
R = Gas constant (= 8.205 x 10-5 atm-m3/mol-°K)

Enthalpy of vaporization at the system temperature:

$$\Delta H_{v,TS} = \Delta H_{v,b}\left[\frac{(1 - T_S/T_C)}{(1 - T_B/T_C)}\right]^n$$

where,

ΔHv,TS = Enthalpy of vaporization at the system temperature (cal/mol)
ΔHv,b = Enthalpy of vaporization at the normal boiling point (cal/mol)
TS = System temperature (°K)
TC = Critical temperature (°K)
TB = Normal boiling point (°K)
n = Constant (unitless) (The value of n is a function of the ratio of TB /TC.)

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TABLE 2.10 Supplement C

Identification of Potential Indoor Air COPCs

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

CAS	Chemical	Henry's Law Constant (atm-m^3/mole)	Reference (1)	Is Chemical Sufficiently Volatile (2)	Inhalation Toxicity Value Available?	Identified as Potential COPC for Indoor Air Pathway?
79-34-5	1,1,2,2-Tetrachloroethane	3.67E-04	RSL	YES	YES	YES
79-00-5	1,1,2-Trichloroethane	8.24E-04	RSL	YES	YES	YES
75-35-4	1,1-Dichloroethene	2.61E-02	RSL	YES	YES	YES
107-06-2	1,2-Dichloroethane	1.18E-03	RSL	YES	YES	YES
106-46-7	1,4-Dichlorobenzene	2.41E-03	RSL	YES	YES	YES
67-64-1	Acetone	3.50E-05	RSL	YES	YES	YES
71-43-2	Benzene	5.55E-03	RSL	YES	YES	YES
75-15-0	Carbon disulfide	1.44E-02	RSL	YES	YES	YES
67-66-3	Chloroform	3.67E-03	RSL	YES	YES	YES
156-59-2	cis-1,2-Dichloroethene	4.08E-03	RSL	YES	YES	YES
110-82-7	Cyclohexane	1.50E-01	RSL	YES	YES	YES
100-41-4	Ethylbenzene	7.88E-03	RSL	YES	YES	YES
98-82-8	Isopropylbenzene	1.15E-02	RSL	YES	YES	YES
110-54-3	Methylcyclohexane	1.80E+00	RSL	YES	YES	YES
127-18-4	Tetrachloroethene	1.77E-02	RSL	YES	YES	YES
108-88-3	Toluene	6.64E-03	RSL	YES	YES	YES
156-60-5	trans-1,2-Dichloroethene	4.08E-03	RSL	YES	YES	YES
79-01-6	Trichloroethene	9.85E-03	RSL	YES	YES	YES
75-01-4	Vinyl chloride	2.78E-02	RSL	YES	YES	YES

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TABLE 2.11

Occurrence, Distribution And Selection of Chemicals of Potential Concern
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air (Industrial)

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Groundwater into Indoor Air	79-34-5	1,1,2,2-Tetrachloroethane	8.6E-01 J	7.9E+01	UG/L	IR49-TW07-10A	5/15	1 - 1	7.9E+01	N/A	2.3E+01 C	2.0E-01	NC2LGW	YES	ASL
	79-00-5	1,1,2-Trichloroethane	3.7E-01 J	6.0E+00	UG/L	IR49-TW07-10A	5/15	1 - 1	6.0E+00	N/A	4.1E+00 N	5.0E+00	MCL	YES	ASL
	75-35-4	1,1-Dichloroethene	3.9E-01 J	9.9E-01 J	UG/L	IR49-TW07-10A	3/15	1 - 1	9.9E-01	N/A	1.1E+02 N	7.0E+00	MCL, NC2LGW	NO	BSL
	107-06-2	1,2-Dichloroethane	3.5E-01 J	6.2E-01 J	UG/L	IR49-TW06-10A	4/15	1 - 1	6.2E-01	N/A	1.4E+01 C	5.0E+00	MCL, NC2LGW	NO	BSL
	106-46-7	1,4-Dichlorobenzene	2.6E-01 J	3.0E-01 J	UG/L	IR49-TW05-10A	3/15	1 - 1	3.0E-01	N/A	1.9E+01 C	7.5E+01	MCL	NO	BSL
	67-64-1	Acetone	2.6E+00 J	6.1E+00	UG/L	IR49-TW08-10A	3/15	2.5 - 10	6.1E+00	N/A	1.4E+07 N	6.0E+03	NC2LGW	NO	BSL
	71-43-2	Benzene	1.9E-01 J	2.5E+00	UG/L	IR49-TW07-10A	4/15	1 - 1	2.5E+00	N/A	1.0E+01 C	1.0E+00	NC2LGW	NO	BSL
	75-15-0	Carbon disulfide	2.1E-01 J	2.1E-01 J	UG/L	IR49-TW01D-09C	1/15	1 - 5	2.1E-01	N/A	6.9E+02 N	7.0E+02	NC2LGW	NO	BSL
	67-66-3	Chloroform	2.5E-01 J	5.5E-01 J	UG/L	IR49-GW03-11A	5/15	1 - 1	5.5E-01	N/A	4.8E+00 C	8.0E+01	MCL	NO	BSL
	156-59-2	cis-1,2-Dichloroethene	3.1E-01 J	1.6E+02	UG/L	IR49-TW07-10A	13/15	1 - 1.5	1.6E+02	N/A	4.1E+01 N	7.0E+01	MCL, NC2LGW	YES	ASL
	110-82-7	Cyclohexane	3.1E-01 J	3.5E+00	UG/L	IR49-TW07-10A	3/15	1 - 5	3.5E+00	N/A	N/A	N/A	N/A	NO	NTX
	100-41-4	Ethylbenzene	1.3E-01 J	1.8E-01 J	UG/L	IR49-TW07-10A	3/15	1 - 1	1.8E-01	N/A	2.5E+01 C	7.0E+02	MCL	NO	BSL
	98-82-8	Isopropylbenzene	2.0E-01 J	5.2E-01 J	UG/L	IR49-TW07-10A	4/15	1 - 1	5.2E-01	N/A	7.0E+02 N	7.0E+01	NC2LGW	NO	BSL
	108-87-2	Methylcyclohexane	2.7E+00	5.9E+00	UG/L	IR49-TW07-10A	3/15	1 - 5	5.9E+00	N/A	4.9E+00 N	N/A	N/A	YES	ASL
	127-18-4	Tetrachloroethene	5.0E-01 J	1.3E+00	UG/L	IR49-TW07-10A	3/15	1 - 1	1.3E+00	N/A	4.3E+00 C	5.0E+00	MCL	NO	BSL
	108-88-3	Toluene	1.0E-01 J	2.8E-01 J	UG/L	IR49-GW01-11A	2/15	1 - 1	2.8E-01	N/A	1.3E+04 N	1.0E+03	MCL	NO	BSL
	156-60-5	trans-1,2-Dichloroethene	6.6E-01 J	1.1E+02	UG/L	IR49-TW07-10A	8/15	1 - 1.5	1.1E+02	N/A	2.1E+02 N	1.0E+02	MCL, NC2LGW	NO	BSL
	79-01-6	Trichloroethene	2.8E-01 J	2.8E+02	UG/L	IR49-TW07-10A	6/15	1 - 3	2.8E+02	N/A	1.6E+01 N	5.0E+00	MCL	YES	ASL
	75-01-4	Vinyl chloride	9.3E-01 J	2.2E+01	UG/L	IR49-TW06-10A	6/15	1 - 1	2.2E+01	N/A	3.0E+00 C	2.0E+00	MCL	YES	ASL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values are two times the arithmetic mean basewide background shallow groundwater concentrations.
Background values are from *Final Base Background Soil Study Report, Marine Corps Base Camp Lejeune, North Carolina* , Baker Environmental, April 25, 2001.

[4] Vapor Intrusion Groundwater Screening Levels. See Table 2.11 Supplement A
Adjusted (RSLs based on non-cancer (N) divided by 10) industrial air RSLs.
RSL for n-hexane used as surrogate for methylcyclohexane.
RSL value for 1,4-dichlorobenzene used as a surrogate for 1,3-dichlorobenzene.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)
Detection Limit Above Screening Level (DLASL), not quantitatively evaluated in HHRA

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)
Below Background (BBK)
Detection Limit Below Screening Level (DLBSL)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
C = Carcinogenic
N = Noncarcinogenic
MCL = Maximum Contaminant Level from EPA's National Primary Drinking Water Standards
NC2LGW = North Carolina Classifications and Groundwater Quality Standards, January, 2010.

Appendix F

TABLE 3.1.RME

Medium-Specific Exposure Point Concentration Summary

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future Medium: Soil* Exposure Medium: Soil*

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
Soil*									
	Aluminum	MG/KG	1.6E+04	N/A	1.7E+04	1.7E+04	MG/KG	Max	1
	Arsenic	MG/KG	4.5E+00	N/A	6.8E+00 J	6.8E+00	MG/KG	Max	1
	Chromium	MG/KG	2.5E+01	N/A	2.8E+01 J	2.8E+01	MG/KG	Max	1
	Iron	MG/KG	1.2E+04	N/A	1.8E+04 J	1.8E+04	MG/KG	Max	1
	Vanadium	MG/KG	3.6E+01	N/A	4.1E+01 J	4.1E+01	MG/KG	Max	1

* Surface soil & subsurface soil combined.

Options: Maximum Detected Value (Max)

Upper Confidence Limit (UCL) Rationale:

(1) Maximum detected concentration used because only two samples available.

NA = Not available

MG/KG = milligrams per kilogram

J = Estimated Value

Appendix F

TABLE 3.2.RME

Medium-Specific Exposure Point Concentration Summary

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)		Exposure Point Concentration			
							Value	Units	Statistic	Rationale
Emissions from Soil*	Chromium	μg/m³	1.9E-05	N/A	2.1E-05	J	2.1E-05	μg/m³	Max	1

* Surface soil & subsurface soil combined.

Options: Maximum Detected Value (Max)

Upper Confidence Limit (UCL) Rationale:

(1) Maximum detected concentration used because only two samples available.

NA = Not available

μg/m³ = micrograms per cubic meter

J = Estimated Value

Appendix F

TABLE 3.3.RME

Medium-Specific Exposure Point Concentration Summary

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)		Maximum Concentration (Qualifier)		Exposure Point Concentration			
								Value	Units	Statistic	Rationale
Tap Water and Water in Excavation Pit	1,1,2,2-Tetrachloroethane	UG/L	9.7E+00	1.0E+02	NP	7.9E+01		7.9E+01	UG/L	Max	4, 5
	1,1,2-Trichloroethane	UG/L	1.3E+00	2.5E+00	NP	6.0E+00		2.5E+00	UG/L	95% KM-t	1, 2, 3
	1,2-Dichloroethane	UG/L	4.6E-01	5.3E-01	NP	6.2E-01	J	5.3E-01	UG/L	95% KM-t	1, 2
	Benzene	UG/L	8.1E-01	1.3E+00	NP	2.5E+00		1.3E+00	UG/L	95% KM-t	1, 2
	Chloroform	UG/L	3.2E-01	4.5E-01	NP	3.9E-01	J	3.9E-01	UG/L	Max	4, 5
	cis-1,2-Dichloroethene	UG/L	3.9E+01	1.2E+02	NP	1.6E+02		1.2E+02	UG/L	95% KM	1, 3
	Tetrachloroethene	UG/L	6.8E-01	9.2E-01	NP	1.3E+00		9.2E-01	UG/L	95% KM-t	1, 2
	trans-1,2-Dichloroethene	UG/L	2.6E+01	5.2E+01	NP	1.1E+02		5.2E+01	UG/L	95% KM-t	1, 2, 3
	Trichloroethene	UG/L	4.9E+01	1.1E+02	NP	2.8E+02		1.1E+02	UG/L	95% KM-BCA	1, 3
	Vinyl chloride	UG/L	5.5E+00	1.0E+01	NP	2.2E+01		1.0E+01	UG/L	95% KM-BCA	1, 3

Dataset includes results from groundwater plume samples MW01, -02, -07, -08, TW01, -01R, -05, -06, and -07.

ProUCL, Version 4.1 used to determine distribution of data using the Shapiro-Wilk W Test. ProUCL used to calculate RME EPC, following recommendations based on distribution and standard deviation in users guide (USEPA. March 2011. ProUCL, Version 4.1. Prepared by Lockheed Martin Environmental Services).

Options: 95% Kaplan-Meier BCA UCL (95% KM-BCA); 95% Kaplan-Meier (Chebyshev) (95% KM);
95% Kaplan-Meier (t) UCL (95% KM-t); Maximum Detected Value (Max)

(1) Shapiro-Wilk W Test/Lilliefors test indicates data are log-normally distributed.

(2) Shapiro-Wilk W Test/Lilliefors indicates data are normally distributed.

(3) Test indicates data are gamma distributed.

(4) Distribution tests are inconclusive

(5) Maximum detected concentration used as EPC because recommended UCL exceeds maximum.

Appendix F

TABLE 3.4.RME

Medium-Specific Exposure Point Concentration Summary

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future Medium: Groundwater Exposure Medium: Air

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)		Maximum Concentration (Qualifier)		Exposure Point Concentration			
								Value	Units	Statistic	Rationale
Water Vapors at Showerhead and in Excavation Pit	1,1,2,2-Tetrachloroethane	UG/L	9.7E+00	1.0E+02	NP	7.9E+01		7.9E+01	UG/L	Max	4, 5
	1,1,2-Trichloroethane	UG/L	1.3E+00	2.5E+00	NP	6.0E+00		2.5E+00	UG/L	95% KM-t	1, 2, 3
	1,2-Dichloroethane	UG/L	4.6E-01	5.3E-01	NP	6.2E-01	J	5.3E-01	UG/L	95% KM-t	1, 2
	Benzene	UG/L	8.1E-01	1.3E+00	NP	2.5E+00		1.3E+00	UG/L	95% KM-t	1, 2
	Chloroform	UG/L	3.2E-01	4.5E-01	NP	3.9E-01	J	3.9E-01	UG/L	Max	4, 5
	cis-1,2-Dichloroethene	UG/L	3.9E+01	1.2E+02	NP	1.6E+02		1.2E+02	UG/L	95% KM	1, 3
	Tetrachloroethene	UG/L	6.8E-01	9.2E-01	NP	1.3E+00		9.2E-01	UG/L	95% KM-t	1, 2
	trans-1,2-Dichloroethene	UG/L	2.6E+01	5.2E+01	NP	1.1E+02		5.2E+01	UG/L	95% KM-t	1, 2, 3
	Trichloroethene	UG/L	4.9E+01	1.1E+02	NP	2.8E+02		1.1E+02	UG/L	95% KM-BCA	1, 3
	Vinyl chloride	UG/L	5.5E+00	1.0E+01	NP	2.2E+01		1.0E+01	UG/L	95% KM-BCA	1, 3

Dataset includes results from groundwater plume samples MW01, -02, -07, -08, TW01, -01R, -05, -06, and -07.

ProUCL, Version 4.1 used to determine distribution of data using the Shapiro-Wilk W Test. ProUCL used to calculate RME EPC, following recommendations based on distribution and standard deviation in users guide (USEPA. March 2011. ProUCL, Version 4.1. Prepared by Lockheed Martin Environmental Services).

Options: 95% Kaplan-Meier BCA UCL (95% KM-BCA); 95% Kaplan-Meier (Chebyshev) (95% KM);
95% Kaplan-Meier (t) UCL (95% KM-t); Maximum Detected Value (Max)

(1) Shapiro-Wilk W Test/Lilliefors test indicates data are log-normally distributed.

(2) Shapiro-Wilk W Test/Lilliefors indicates data are normally distributed.

(3) Test indicates data are gamma distributed.

(4) Distribution tests are inconclusive

(5) Maximum detected concentration used because sample size is less than 5.

Appendix F

TABLE 3.1.CTE

Medium-Specific Exposure Point Concentration Summary

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future Medium: Soil* Exposure Medium: Soil*

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
Soil*									
	Aluminum	MG/KG	1.6E+04	N/A	1.7E+04	1.6E+04	MG/KG	Mean-N	1
	Arsenic	MG/KG	4.5E+00	N/A	6.8E+00 J	4.5E+00	MG/KG	Mean-N	1
	Chromium	MG/KG	2.5E+01	N/A	2.8E+01 J	2.5E+01	MG/KG	Mean-N	1
	Iron	MG/KG	1.2E+04	N/A	1.8E+04 J	1.2E+04	MG/KG	Mean-N	1
	Vanadium	MG/KG	3.6E+01	N/A	4.1E+01 J	3.6E+01	MG/KG	Mean-N	1

* Surface soil & subsurface soil combined.

Options: Mean-Normal (Mean-N)

Upper Confidence Limit (UCL) Rationale:

(1) Mean normal detected concentration used because only two samples available.

NA = Not available

MG/KG = milligrams per kilogram

J = Estimated Value

Appendix F

TABLE 3.2.CTE

Medium-Specific Exposure Point Concentration Summary

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
Emissions from Soil*	Chromium	μg/m^3	1.9E-05	N/A	2.1E-05 J	1.9E-05	μg/m^3	Mean-N	1

* Surface soil & subsurface soil combined.

Options: Mean-Nonparametric (Mean-NP); Mean-Normal (Mean-N); Maximum Detected Value (Max)

Upper Confidence Limit (UCL) Rationale:

Options: Mean-Normal (Mean-N)

NA = Not available

μg/m^3 = micrograms per cubic meter

J = Estimated Value

Appendix F

TABLE 3.3.CTE

Medium-Specific Exposure Point Concentration Summary

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future Medium: Groundwater Exposure Medium: Groundwater

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)		Maximum Concentration (Qualifier)		Exposure Point Concentration			
								Value	Units	Statistic	Rationale
Tap Water and Water in Excavation Pit	1,1,2,2-Tetrachloroethane	UG/L	9.7E+00	1.0E+02	NP	7.9E+01		9.7E+00	UG/L	Mean-NP	4
	1,1,2-Trichloroethane	UG/L	1.3E+00	2.5E+00	NP	6.0E+00		1.3E+00	UG/L	Mean-NP	1, 2, 3
	1,2-Dichloroethane	UG/L	4.6E-01	5.3E-01	NP	6.2E-01	J	4.6E-01	UG/L	Mean-NP	1, 2
	Benzene	UG/L	8.1E-01	1.3E+00	NP	2.5E+00		8.1E-01	UG/L	Mean-NP	1, 2
	Chloroform	UG/L	3.2E-01	4.5E-01	NP	3.9E-01	J	3.2E-01	UG/L	Mean-NP	4
	cis-1,2-Dichloroethene	UG/L	3.9E+01	1.2E+02	NP	1.6E+02		3.9E+01	UG/L	Mean-NP	1, 3
	Tetrachloroethene	UG/L	6.8E-01	9.2E-01	NP	1.3E+00		6.8E-01	UG/L	Mean-NP	1, 2
	trans-1,2-Dichloroethene	UG/L	2.6E+01	5.2E+01	NP	1.1E+02		2.6E+01	UG/L	Mean-NP	1, 2, 3
	Trichloroethene	UG/L	4.9E+01	1.1E+02	NP	2.8E+02		4.9E+01	UG/L	Mean-NP	1, 3
	Vinyl chloride	UG/L	5.5E+00	1.0E+01	NP	2.2E+01		5.5E+00	UG/L	Mean-NP	1, 3

Dataset includes results from groundwater plume samples MW01, -02, -07, -08, TW01, -01R, -05, -06, and -07.

ProUCL, Version 4.1 used to determine distribution of data using the Shapiro-Wilk W Test. ProUCL used to calculate RME EPC, following recommendations based on distribution and standard deviation in users guide (USEPA. March 2011. ProUCL, Version 4.1. Prepared by Lockheed Martin Environmental Services).

Options: Mean-Nonparametric (Mean-NP)

(1) Shapiro-Wilk W Test/Lilliefors test indicates data are log-normally distributed.

(2) Shapiro-Wilk W Test/Lilliefors indicates data are normally distributed.

(3) Test indicates data are gamma distributed.

(4) Distribution tests are inconclusive

Appendix F

TABLE 3.4.CTE

Medium-Specific Exposure Point Concentration Summary

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)		Maximum Concentration (Qualifier)		Exposure Point Concentration			
								Value	Units	Statistic	Rationale
Water Vapors at Showerhead and in Excavation Pit	1,1,2,2-Tetrachloroethane	UG/L	9.7E+00	1.0E+02	NP	7.9E+01		9.7E+00	UG/L	Mean-NP	4
	1,1,2-Trichloroethane	UG/L	1.3E+00	2.5E+00	NP	6.0E+00		1.3E+00	UG/L	Mean-NP	1, 2, 3
	1,2-Dichloroethane	UG/L	4.6E-01	5.3E-01	NP	6.2E-01	J	4.6E-01	UG/L	Mean-NP	1, 2
	Benzene	UG/L	8.1E-01	1.3E+00	NP	2.5E+00		8.1E-01	UG/L	Mean-NP	1, 2
	Chloroform	UG/L	3.2E-01	4.5E-01	NP	3.9E-01	J	3.2E-01	UG/L	Mean-NP	4
	cis-1,2-Dichloroethene	UG/L	3.9E+01	1.2E+02	NP	1.6E+02		3.9E+01	UG/L	Mean-NP	1, 3
	Tetrachloroethene	UG/L	6.8E-01	9.2E-01	NP	1.3E+00		6.8E-01	UG/L	Mean-NP	1, 2
	trans-1,2-Dichloroethene	UG/L	2.6E+01	5.2E+01	NP	1.1E+02		2.6E+01	UG/L	Mean-NP	1, 2, 3
	Trichloroethene	UG/L	4.9E+01	1.1E+02	NP	2.8E+02		4.9E+01	UG/L	Mean-NP	1, 3
	Vinyl chloride	UG/L	5.5E+00	1.0E+01	NP	2.2E+01		5.5E+00	UG/L	Mean-NP	1, 3

Dataset includes results from groundwater plume samples MW01, -02, -07, -08, TW01, -01R, -05, -06, and -07.

ProUCL, Version 4.1 used to determine distribution of data using the Shapiro-Wilk W Test. ProUCL used to calculate RME EPC, following recommendations based on distribution and standard deviation in users guide (USEPA. March 2011. ProUCL, Version 4.1. Prepared by Lockheed Martin Environmental Services).

Options: Mean-Nonparametric (Mean-NP)

(1) Shapiro-Wilk W Test/Lilliefors test indicates data are log-normally distributed.
(2) Shapiro-Wilk W Test/Lilliefors indicates data are normally distributed.
(3) Test indicates data are gamma distributed.
(4) Distribution tests are inconclusive

Appendix G
TABLE 4.1.RME
Values Used For Daily Intake Calculations
Reasonable Maximum Exposure
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult	Soil*	CS	Chemical Concentration in Soil	See Table 3.1.RME	mg/kg	See Table 3.1.RME	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-S	Ingestion Rate of Soil	100	mg/day	EPA, 1991	CS x IR-S x EF x ED x CF x 1/BW x 1/AT
				EF	Exposure Frequency	350	days/year	EPA, 1991	
				ED	Exposure Duration	24	years	EPA, 1991	
				CF	Conversion Factor	0.000001	kg/mg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
		Child	Soil*	CS	Chemical Concentration in Soil	See Table 3.1.RME	mg/kg	See Table 3.1.RME	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-S	Ingestion Rate of Soil	200	mg/day	EPA, 1991	CS x IR-S x EF x ED x CF x 1/BW x 1/AT
				EF	Exposure Frequency	350	days/year	EPA, 1991	
				ED	Exposure Duration	6	years	EPA, 1991	
				CF	Conversion Factor	0.000001	kg/mg	- -	
				BW	Body Weight	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
	Resident	Child/Adult	Soil*	CS	Chemical Concentration in Soil	See Table 3.1.RME	mg/kg	See Table 3.1.RME	Carcinogenic
				IR-Sa	Ingestion Rate of Soil-adult	100	mg/day	EPA, 1991	Chronic Daily Intake (CDI) (mg/kg-day) =
				EDa	Exposure Duration adult	24	years	EPA, 1991	CS x IR-S x EF x CF x 1/AT
				BWa	Body Weight adult	70	kg	EPA, 1991	
				IR-Sc	Ingestion Rate of Soil-child	200	mg/day	EPA, 1991	
				EDc	Exposure Duration child	6	years	EPA, 1991	IR-S = (EDc * IR-Sc/ BWc) +
				BWc	Body Weight child	15	kg	EPA, 1991	(EDa * IR-Sa/BWa)
				IR-S	Ingestion Rate of Soil-adjusted	114.29	mg-year/kg-day	- -	
				EF	Exposure Frequency	350	days/year	EPA, 1991	
				CF3	Conversion Factor 3	0.000001	kg/mg	- -	
				AT-C	Averaging Time (Cancer)	25550	days	EPA, 1989	

Appendix G
TABLE 4.1.RME
Values Used For Daily Intake Calculations
Reasonable Maximum Exposure
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Construction Worker	Adult	Soil*	CS	Chemical Concentration in Soil	See Table 3.1.RME	mg/kg	See Table 3.1.RME	CDI (mg/kg-day) =
				IR-S	Ingestion Rate of Soil	330	mg/day	EPA, 2002	CS x IR-S x EF x ED x CF x 1/BW x 1/AT
				EF	Exposure Frequency	250	days/year	EPA, 2002	
				ED	Exposure Duration	1	years	EPA, 2002	
				CF	Conversion Factor	0.000001	kg/mg	- -	
				BW	Body Weight	70	kg	EPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	365	days	EPA, 1989	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
	Industrial Worker	Adult	Soil*	CS	Chemical Concentration in Soil	See Table 3.1.RME	mg/kg	See Table 3.1.RME	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-S	Ingestion Rate of Soil	100	mg/day	EPA, 1991	CS x IR-S x EF x ED x CF1 x 1/BW x 1/AT
				EF	Exposure Frequency	250	days/year	EPA, 1991	
				ED	Exposure Duration	25	years	EPA, 1991	
				CF	Conversion Factor	0.000001	kg/mg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	EPA, 1989	
	Site Worker	Adult	Soil*	CS	Chemical Concentration in Soil	see Table 3.1.RME	mg/kg	see Table 3.3.RME	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-S	Ingestion Rate of Soil	100	mg/day	EPA, 1991	CS x IR-S x EF x ED x CF x 1/BW x 1/AT
				EF	Exposure Frequency	52	days/year	(1)	
				ED	Exposure Duration	25	years	EPA, 1991	
				CF	Conversion Factor	0.000001	kg/mg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	EPA, 1989	
	Trespasser/Visitor	Adult	Soil*	CS	Chemical Concentration in Soil	see Table 3.1.RME	mg/kg	see Table 3.3.RME	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-S	Ingestion Rate of Soil	100	mg/day	EPA, 1991	CS x IR-S x EF x ED x CF1 x 1/BW x 1/AT
				EF	Exposure Frequency	52	days/year	(1)	
				ED	Exposure Duration	24	years	EPA, 1991	
				CF	Conversion Factor	0.000001	kg/mg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	

Appendix G
TABLE 4.1.RME
Values Used For Daily Intake Calculations
Reasonable Maximum Exposure
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
		Youth	Soil*	CS	Chemical Concentration in Soil	see Table 3.1.RME	mg/kg	see Table 3.3.RME	CDI (mg/kg-day) =
				IR-S	Ingestion Rate of Soil	100	mg/day	EPA, 1991	CS x IR-S x EF x ED x CF1 x 1/BW x 1/AT
				EF	Exposure Frequency	52	days/year	(1)	
				ED	Exposure Duration	10	years	EPA, 2000, (2)	
				CF	Conversion Factor	0.000001	kg/mg	- -	
				BW	Body Weight	45	kg	EPA, 2000	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,650	days	EPA, 1989	
Dermal	Resident	Adult	Soil*	CS	Chemical Concentration in Soil	See Table 3.1.RME	mg/kg	See Table 3.1.RME	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	5,700	cm^2	EPA, 2004	CS x SA x SSAF x DABS x CF x EF x
				SSAF	Soil to Skin Adherence Factor	0.07	mg/cm^2-day	EPA, 2004	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	Chemical Specific	--	EPA, 2004	
				CF	Conversion Factor	0.000001	kg/mg	- -	
				EF	Exposure Frequency	350	days/year	EPA, 1991	
				ED	Exposure Duration	24	years	EPA, 1991	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
		Child	Soil*	CS	Chemical Concentration in Soil	See Table 3.1.RME	mg/kg	See Table 3.1.RME	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	2,800	cm^2	EPA, 2004	CS x SA x SSAF x DABS x CF x EF x
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm^2-day	EPA, 2004	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	Chemical Specific	--	EPA, 2004	
				CF	Conversion Factor	0.000001	kg/mg	- -	
				EF	Exposure Frequency	350	days/year	EPA, 1991	
				ED	Exposure Duration	6	years	EPA, 1991	
				BW	Body Weight	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	

Appendix G
TABLE 4.1.RME
Values Used For Daily Intake Calculations
Reasonable Maximum Exposure
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
		Child/Adult	Soil*	CS	Chemical Concentration in Soil	See Table 3.1.RME	mg/kg	See Table 3.1.RME	Carcinogenic CDI (mg/kg-day) =
				SAc	Skin Surface Area child	2,800	cm^2	EPA, 2004	CS x SA x DABS x CF3 x EF x 1/AT
				SSAFc	Soil to Skin Adherence Factor child	0.2	mg/cm^2-day	EPA, 2004	
				EDc	Exposure Duration child	6	years	EPA, 1991	SA =
				BWc	Body Weight child	15	kg	EPA, 1991	((EDc * SAc/BWc)*SSAFc) +
				SAa	Skin Surface Area adult	5,700	cm^2	EPA, 2004	'((EDa * SAa/BWa)*SSAFa)
				SSAFa	Soil to Skin Adherence Factor-adult	0.07	mg/cm^2-day	EPA, 2004	
				EDa	Exposure Duration adult	24	years	EPA, 1991	
				BWa	Body Weight adult	70	kg	EPA, 1991	
				SA	Skin Surface Area adjusted	361	cm^2-year/kg-day	---	
				DABS	Dermal Absorption Factor Solids	Chemical Specific	--	EPA, 2004	
				CF3	Conversion Factor 3	0.000001	kg/mg	- -	
				EF	Exposure Frequency	350	days/year	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
Dermal	Construction Worker	Adult	Soil*	CS	Chemical Concentration in Soil	See Table 3.1.RME	mg/kg	See Table 3.1.RME	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	3,300	cm^2	EPA, 2004	CS x SA x SSAF x DABS x CF x EF x
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm^2-day	EPA, 2004	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	Chemical Specific	--	EPA, 2004	
				CF	Conversion Factor	0.000001	kg/mg	- -	
				EF	Exposure Frequency	250	days/years	EPA, 2002	
				ED	Exposure Duration	1	years	EPA, 2002	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	EPA, 1989	
	Industrial Worker	Adult	Soil*	CS	Chemical Concentration in Soil	See Table 3.1.RME	mg/kg	See Table 3.1.RME	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	3,300	cm^2	EPA, 2004	CS x SA x SSAF x DABS x CF x EF x
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm^2-day	EPA, 2004	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	Chemical Specific	--	EPA, 2004	
				CF	Conversion Factor	0.000001	kg/mg	- -	
				EF	Exposure Frequency	250	days/year	EPA, 1991	
				ED	Exposure Duration	25	years	EPA, 1991	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	EPA, 1989	

Appendix G
TABLE 4.1.RME
Values Used For Daily Intake Calculations
Reasonable Maximum Exposure
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
	Site Worker	Adult	Soil*	CS	Chemical Concentration in Soil	See Table 3.1.RME	mg/kg	See Table 3.1.RME	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	3,300	cm^2	EPA, 2004	CS x SA x SSAF x DABS x CF x EF x
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm^2-day	EPA, 2004	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	Chemical Specific	--	EPA, 2004	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				EF	Exposure Frequency	52	days/year	(1)	
				ED	Exposure Duration	25	years	EPA, 1991	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	EPA, 1989	
	Trespasser/Visitor	Adult	Soil*	CS	Chemical Concentration in Soil	see Table 3.1.RME	mg/kg	see Table 3.3.RME	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	5,700	cm^2	EPA, 2004	CS x SA x SSAF x DABS x CF1 x EF x
				SSAF	Soil to Skin Adherence Factor	0.07	mg/cm^2-day	EPA, 2004	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	Chemical Specific	--	EPA, 2004	
				CF	Conversion Factor	0.000001	kg/mg	- -	
				EF	Exposure Frequency	52	days/year	(1)	
				ED	Exposure Duration	24	years	EPA, 1991	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
		Youth	Soil*	CS	Chemical Concentration in Soil	see Table 3.1.RME	mg/kg	see Table 3.3.RME	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	4,200	cm^2	EPA, 2004, (3)	CS x SA x SSAF x DABS x CF1 x EF x
				SSAF	Soil to Skin Adherence Factor	0.04	mg/cm^2-day	EPA, 2004, (4)	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	Chemical Specific	--	EPA, 2004	
				CF	Conversion Factor	0.000001	kg/mg	- -	
				EF	Exposure Frequency	52	days/year	(1)	
				ED	Exposure Duration	10	years	EPA, 2000, (2)	
				BW	Body Weight	45	kg	EPA, 2000	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,650	days	EPA, 1989	

Appendix G

TABLE 4.1.RME

Values Used For Daily Intake Calculations

Reasonable Maximum Exposure

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name

* Surface soil & subsurface soil combined

(1) Professional judgment assuming 1 day per week for 52 weeks per year.

(2) Adolescents from 7 to 16 years of age, per EPA 2000.

(3) The skin surface area includes the head, hands, forearms and lower legs for the 7 through 16 year olds.

(4) SSAF is the geometric mean weighted soil adherence for soccer players (teens, 13-15 years old) from EPA, 2004, Exhibit 3-3.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

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EPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

EPA, 2004: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Appendix G
TABLE 4.1.RME
Values Used For Daily Intake Calculations
Reasonable Maximum Exposure
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Resident	Adult	Emissions from Soil*	CS	Chemical Concentration in Soil	See Table 3.1.RME	mg/kg	See Table 3.1.RME	Exposure Concentration (EC) (mg/m^3) =
				CA	Chemical Concentration in Air	See Table 3.2.RME	mg/m^3	See Table 3.2.RME	CA x ET x EF x ED x CF x 1/AT
				PEF	Particulate Emission Factor	1.36E+09	m^3/kg	EPA, 2002	
				VF	Volatilization Factor for volatile constituents	Calculated	m^3/kg	EPA, 2002	CA (mg/m^3) = CS (1/PEF + 1/VF)
				ET	Exposure Time	24	hour/day	--	
				EF	Exposure Frequency	350	days/year	EPA, 1991	
				ED	Exposure Duration	24	years	EPA, 1991	
				CF	Conversion Factor	1/24	day/hr	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
		Child	Emissions from Soil*	CS	Chemical Concentration in Soil	See Table 3.1.RME	mg/kg	See Table 3.1.RME	Exposure Concentration (EC) (mg/m^3) =
				CA	Chemical Concentration in Air	See Table 3.2.RME	mg/m^3	See Table 3.2.RME	CA x ET x EF x ED x CF x 1/AT
				PEF	Particulate Emission Factor	1.36E+09	m^3/kg	EPA, 2002	
				VF	Volatilization Factor for volatile constituents	Calculated	m^3/kg	EPA, 2002	CA (mg/m^3) = CS (1/PEF + 1/VF)
				ET	Exposure Time	24	hour/day	--	
				EF	Exposure Frequency	350	days/year	EPA, 1991	
				ED	Exposure Duration	6	years	EPA, 1991	
				CF	Conversion Factor	1/24	day/hr	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
		Child/Adult	Emissions from Soil*	CS	Chemical Concentration in Soil	See Table 3.1.RME	mg/kg	See Table 3.1.RME	Exposure Concentration (EC) (mg/m^3) =
				CA	Chemical Concentration in Air	See Table 3.2.RME	mg/m^3	See Table 3.2.RME	CA x ET x EF x ED x CF x 1/AT
				PEF	Particulate Emission Factor	1.36E+09	m^3/kg	EPA, 2002	CA (mg/m^3) = CS (1/PEF + 1/VF)
				VF	Volatilization Factor for volatile constituents	Calculated	m^3/kg	EPA, 2002	
				EF	Exposure Frequency	350	days/year	EPA, 1991	
				ED	Exposure Duration	30	years	EPA, 2002	
				ET	Exposure Time	24	hr/day	EPA, 2009	
				CF	Conversion Factor	1/24	day/hr	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	

Appendix G
TABLE 4.1.RME
Values Used For Daily Intake Calculations
Reasonable Maximum Exposure
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Construction Worker	Adult	Emissions from Soil*	CS	Chemical Concentration in Soil	See Table 3.1.RME	mg/kg	See Table 3.1.RME	Exposure Concentration (EC) (mg/m^3) =
				CA	Chemical Concentration in Air	See Table 3.2.RME	mg/m^3	See Table 3.2.RME	CA x ET x EF x ED x CF x 1/AT
				PEF	Particulate Emission Factor	1.36E+09	m^3/kg	EPA, 2002	
				VF	Volatilization Factor for volatile constituents	Calculated	m^3/kg	EPA, 2002	CA (mg/m^3) = CS (1/PEF + 1/VF)
				EF	Exposure Frequency	250	days/year	EPA,1991	
				ED	Exposure Duration	1	years	EPA, 2002	
				ET	Exposure Time	8	hour/day	EPA, 1991	
				CF	Conversion Factor	1/24	day/hr	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	EPA, 1989	
	Industrial Worker	Adult	Emissions from Soil*	CS	Chemical Concentration in Soil	See Table 3.1.RME	mg/kg	See Table 3.1.RME	Exposure Concentration (EC) (mg/m^3) =
				CA	Chemical Concentration in Air	See Table 3.2.RME	mg/m^3	See Table 3.2.RME	CA x ET x EF x ED x CF x 1/AT
				PEF	Particulate Emission Factor	1.36E+09	m^3/kg	EPA, 2002	
				VF	Volatilization Factor for volatile constituents	Calculated	m^3/kg	EPA, 2002	CA (mg/m^3) = CS (1/PEF + 1/VF)
				ET	Exposure Time	8	hour/day	EPA, 1991	
				EF	Exposure Frequency	250	days/year	EPA, 1991	
				ED	Exposure Duration	25	years	EPA, 1991	
				CF	Conversion Factor	1/24	day/hr	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	EPA, 1989	
	Site Worker	Adult	Emissions from Soil*	CS	Chemical Concentration in Soil	See Table 3.2.RME	mg/kg	See Table 3.2.RME	Exposure Concentration (EC) (mg/m3) =
				CA	Chemical Concentration in Air	See Table 3.2.RME	mg/m^3	See Table 3.2.RME	CA x ET x EF x ED x CF x 1/AT
				PEF	Particulate Emission Factor	1.32E+09	m^3/kg	EPA, 2002	
				VF	Volatilization Factor for volatile constituents	calc	m^3/kg	EPA, 1996	CA (mg/m3) = CS (1/PEF + 1/VF)
				ET	Exposure Time	8	hour/day	EPA, 1991	
				EF	Exposure Frequency	52	days/year	(1)	
				CF	Conversion Factor 1	1/24	day/hr	- -	
				ED	Exposure Duration	25	years	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	EPA, 1989	

Appendix G
TABLE 4.1.RME
Values Used For Daily Intake Calculations
Reasonable Maximum Exposure
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (cont'd)	Trespasser/Visitor	Adult	Emissions from Soil*	CS	Chemical Concentration in Soil	25550	mg/kg	EPA, 1989	Exposure Concentration (EC) (mg/m^3) =
				CA	Chemical Concentration in Air	calc	mg/m^3	calc	CA x ET x EF x ED x CF x 1/AT
				PEF	Particulate Emission Factor	1.36E+09	m^3/kg	EPA, 2002	
				VF	Volatilization Factor for volatile constituents	calc	m^3/kg	EPA, 2002	CA (mg/m^3) = CS (1/PEF + 1/VF)
				ET	Exposure Time	2	hour/day	(2)	
				EF	Exposure Frequency	52	days/year	(1)	
				ED	Exposure Duration	24	years	EPA, 1991	
				CF	Conversion Factor 1	1/24	day/hr	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
		Youth	Emissions from Soil*	CS	Chemical Concentration in Soil	25550	mg/kg	EPA, 1989	Exposure Concentration (EC) (mg/m^3) =
				CA	Chemical Concentration in Air	calc	mg/m^3	calc	CA x ET x EF x ED x CF x 1/AT
				PEF	Particulate Emission Factor	1.36E+09	m^3/kg	EPA, 2002	
				VF	Volatilization Factor for volatile constituents	calc	m^3/kg	EPA, 2002	CA (mg/m^3) = CS (1/PEF + 1/VF)
				ET	Exposure Time	2	hour/day	(2)	
				EF	Exposure Frequency	52	days/year	(1)	
				ED	Exposure Duration	10	years	EPA, 2000	
				CF	Conversion Factor 1	1/24	day/hr	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,650	days	EPA, 1989	

* Surface and subsurface soil combined.

(1) Professional judgment assuming 2 hours per day, 1 day per week, for 52 weeks per year.

(2) Professional judgment assuming 2 hours per day.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 2000: Supplemental Guidance to RAGS: Region 4 Bulletins, Human Health Risk Assessment Bulletins. www.epa.gov/region4/waste/oftecser/healtbul.htm.

EPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

Appendix G
TABLE 4.3.RME
Values Used For Daily Intake Calculations
Reasonable Maximum Exposure
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult	Groundwater - Tap Water	CW	Chemical Concentration in Water	See Table 3.3.RME	µg/l	See Table 3.3.RME	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-W	Ingestion Rate of Water	2	liters/day	EPA, 1997	CW x IR-W x EF x ED x CF1 x 1/BW x 1/AT
				EF	Exposure Frequency	350	days/year	EPA, 1991	
				ED	Exposure Duration	24	years	EPA, 1991	
				CF1	Conversion Factor 1	0.001	mg/µg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
		Child	Groundwater - Tap Water	CW	Chemical Concentration in Water	See Table 3.3.RME	µg/l	See Table 3.3.RME	CDI (mg/kg-day) =
				IR-W	Ingestion Rate of Water	1	liters/day	EPA, 1997	CW x IR-W x EF x ED x CF1 x 1/BW x 1/AT
				EF	Exposure Frequency	350	days/year	EPA, 1991	
				ED	Exposure Duration	6	years	EPA, 1991	
				CF1	Conversion Factor 1	0.001	mg/µg	- -	
				BW	Body Weight	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
		Child/Adult	Groundwater - Tap Water	CW	Chemical Concentration in Water	See Table 3.3.RME	µg/l	See Table 3.3.RME	CDI (mg/kg-day) =
				IR-W-A	Ingestion Rate of Water, Adult	2	liters/day	EPA, 1997	CW x IR-W-Adj x EF x CF1 x 1/AT
				IR-W-C	Ingestion Rate of Water, Child	1	liters/day	EPA, 1997	
				IR-W-Adj	Ingestion Rate of Water, Age-adjusted	1.09	liter-year/kg-day	Calculated	IR-W-Adj (liter-year/kg-day) =
				EF	Exposure Frequency	350	days/year	EPA, 1991	(ED-C x IR-W-C / BW-C) +
				ED-A	Exposure Duration, Adult	24	years	EPA, 1991	(ED-A x IR-W-A / BW-A)
				ED-C	Exposure Duration, Child	6	years	EPA, 1991	
				CF1	Conversion Factor 1	0.001	mg/µg	- -	
				BW-A	Body Weight , Adult	70	kg	EPA, 1991	
				BW-C	Body Weight, Child	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	

Appendix G
TABLE 4.3.RME
Values Used For Daily Intake Calculations
Reasonable Maximum Exposure
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Industrial Worker	Adult	Groundwater - Tap Water	CW	Chemical Concentration in Water	See Table 3.3.RME	µg/l	See Table 3.3.RME	CDI (mg/kg-day) =
				IR-W	Ingestion Rate of Water	1	liters/day	EPA, 1991	CW x IR-W x EF x ED x CF1 x 1/BW x 1/AT
				EF	Exposure Frequency	250	days/year	EPA, 1991	
				ED	Exposure Duration	25	years	EPA, 1991	
				CF1	Conversion Factor 1	0.001	mg/µg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	EPA, 1989	
Dermal	Resident	Adult	Groundwater - Tap Water	CW	Chemical Concentration in Water	See Table 3.3.RME	µg/l	See Table 3.3.RME	CDI (mg/kg-day) =
				DAevent	Dermally Absorbed Dose per Event	Calculated	mg/cm^2-event	Calculated	DAevent x SA x EV x EF x ED x 1/BW x 1/AT
				FA	Fraction absorbed water	Chemical Specific	dimensionless	EPA, 2004	
				K_p	Permeability Coefficient	Chemical Specific	cm/hr	EPA, 2004	Inorganics: DAevent (mg/cm^2-event) =
				τ	Lag Time	Chemical Specific	hr/event	EPA, 2004	Kp x CW x tevent x CF1 x CF2
				t*	Time to Reach Steady-state	Chemical Specific	hours	EPA, 2004	
				B	Ratio of Permeability of Stratum Corneum to Epidermis	Chemical Specific	dimensionless	EPA, 2004	Organics :
				t_{event}	Event Time	0.58	hr/event	EPA, 2004	t_{event}<t*: DAevent (mg/cm^2-event) =
				SA	Skin Surface Area Available for Contact	18,000	cm^2	EPA, 2004	2 x FA x Kp x CW x (sqrt((6 x τ x t_{event})/π))
				EV	Event Frequency	1	events/day	EPA, 2004	x CF1 x CF2
				EF	Exposure Frequency	350	days/year	EPA, 2004	
				ED	Exposure Duration	24	years	EPA, 2004	t_{event}>t*: DAevent (mg/cm^2-event) =
				BW	Body Weight	70	kg	EPA, 1991	FA x Kp x CW x (t_{event}/(1+B) + 2 x τ
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	x ((1 + 3B + 3B2)/(1+B)2)) x CF1 x CF2
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
				CF1	Conversion Factor 1	0.001	mg/µg	- -	
				CF2	Conversion Factor 2	0.001	l/cm^3	- -	

Appendix G
TABLE 4.3.RME
Values Used For Daily Intake Calculations
Reasonable Maximum Exposure
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
	Resident	Child	Groundwater - Tap Water	CW	Chemical Concentration in Water	See Table 3.3.RME	µg/l	See Table 3.3.RME	CDI (mg/kg-day) =
				DAevent	Dermally Absorbed Dose per Event	Calculated	mg/cm^2-event	Calculated	DAevent x SA x EV x EF x ED x 1/BW x 1/AT
				FA	Fraction absorbed water	Chemical Specific	dimensionless	EPA, 2004	
				K_p	Permeability Coefficient	Chemical Specific	cm/hr	EPA, 2004	Inorganics: DAevent (mg/cm^2-event) =
				τ	Lag Time	Chemical Specific	hr/event	EPA, 2004	Kp x CW x tevent x CF1 x CF2
				t*	Time to Reach Steady-state	Chemical Specific	hours	EPA, 2004	
				B	Ratio of Permeability of Stratum Corneum to Epidermis	Chemical Specific	dimensionless	EPA, 2004	Organics :
				t_{event}	Event Time	1	hr/event	EPA, 2004	t_{event}<t*: DAevent (mg/cm^2-event) =
				SA	Skin Surface Area Available for Contact	6,600	cm^2	EPA, 2004	2 x FA x Kp x CW x (sqrt((6 x τ x t_{event})/π))
				EV	Event Frequency	1	events/day	EPA, 2004	x CF1 x CF2
				EF	Exposure Frequency	350	days/year	EPA, 2004	
				ED	Exposure Duration	6	years	EPA, 2004	t_{event}>t*: DAevent (mg/cm^2-event) =
				BW	Body Weight	15	kg	EPA, 1991	FA x Kp x CW x (t_{event}/(1+B) + 2 x τ
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	x ((1 + 3B + 3B2)/(1+B)2)) x CF1 x CF2
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
				CF1	Conversion Factor 1	0.001	mg/µg	- -	
				CF2	Conversion Factor 2	0.001	l/cm^3	- -	
Dermal	Resident	Child/Adult	Groundwater - Tap Water	CW	Chemical Concentration in Water	See Table 3.3.RME	µg/l	See Table 3.3.RME	CDI (mg/kg-day) = DA-Adj x EF x 1/AT
				DAevent-A	Dermally Absorbed Dose per Event, Adult	Calculated	mg/cm^2-event	Calculated	
				DAevent-C	Dermally Absorbed Dose per Event, Child	Calculated	mg/cm^2-event	Calculated	DA-Adj = (DAevent-A x SA-A x ED-A x 1/BW-A)
				DA-Adj	Dermally Absorbed Dose, Age-adjusted	Calculated	mg-year/event-kg	Calculated	+ (DAevent-C x SA-C x ED-C x 1/BW-C)
				FA	Fraction absorbed water	Chemical Specific	dimensionless	EPA, 2004	
				K_p	Permeability Coefficient	Chemical Specific	cm/hr	EPA, 2004	Inorganics: DAevent (mg/cm^2-event) =
				τ	Lag Time	Chemical Specific	hr/event	EPA, 2004	Kp x CW x tevent x CF1 x CF2
				t*	Time to Reach Steady-state	Chemical Specific	hours	EPA, 2004	
				B	Epidermis	Chemical Specific	dimensionless	EPA, 2004	Organics :
				t_{event}-A	Event Time, Adult	0.58	hr/event	EPA, 2004	t_{event}<t*: DAevent (mg/cm^2-event) =
				t_{event}-C	Event Time, Child	1	hr/event	EPA, 2004	2 x FA x Kp x CW x (sqrt((6 x τ x t_{event})/π))
				SA-A	Skin Surface Area, Adult	18,000	cm^2	EPA, 2004	x CF1 x CF2

Appendix G
TABLE 4.3.RME
Values Used For Daily Intake Calculations
Reasonable Maximum Exposure
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
				SA-C	Skin Surface Area, Child	6,600	cm^2	EPA, 2004	
				EV	Event Frequency	1	events/day	EPA, 2004	t_{event}>t*: DAevent (mg/cm^2-event) =
				EF	Exposure Frequency	350	days/year	EPA, 2004	FA x Kp x CW x (t_{event}/(1+B) + 2 x τ
				ED-A	Exposure Duration, Adult	24	years	EPA, 2004	x ((1 + 3B + 3B2)/(1+B)2)) x CF1 x CF2
				ED-C	Exposure Duration, Child	6	years	EPA, 2004	
				BW-A	Body Weight, Adult	70	kg	EPA, 1991	
				BW-C	Body Weight, Child	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				CF1	Conversion Factor 1	0.001	mg/µg	- -	
				CF2	Conversion Factor 2	0.001	l/cm^3	- -	
Dermal	Construction Worke	Adult	Groundwater - Water in Excavation Pit	CW	Chemical Concentration in Water	See Table 3.3.RME	µg/l	See Table 3.3.RME	CDI (mg/kg-day) =
				DAevent	Dermally Absorbed Dose per Event	Calculated	mg/cm^2-event	Calculated	DAevent x SA x EV x EF x ED x 1/BW x 1/AT
				FA	Fraction absorbed water	Chemical Specific	dimensionless	EPA, 2004	
				K_p	Permeability Coefficient	Chemical Specific	cm/hr	EPA, 2004	Inorganics: DAevent (mg/cm^2-event) =
				τ	Lag Time	Chemical Specific	hr/event	EPA, 2004	Kp x CW x tevent x CF1 x CF2
				t*	Time to Reach Steady-state	Chemical Specific	hours	EPA, 2004	
				B	Epidermis	Chemical Specific	dimensionless	EPA, 2004	Organics :
				t_{event}	Event Time	4	hr/day	(1)	t_{event}<t*: DAevent (mg/cm^2-event) =
				SA	Skin Surface Area Available for Contact	5,700	cm^2	EPA, 2004, (3)	2 x FA x Kp x CW x (sqrt((6 x τ x t_{event})/π))
				EV	Event Frequency	1	events/day	EPA, 2004	x CF1 x CF2
				EF	Exposure Frequency	125	days/year	(2)	
				ED	Exposure Duration	1	years	EPA, 1991	t_{event}>t*: DAevent (mg/cm^2-event) =
				BW	Body Weight	70	kg	EPA, 1991	FA x Kp x CW x (t_{event}/(1+B) + 2 x τ
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	x ((1 + 3B + 3B2)/(1+B)2)) x CF1 x CF2
				AT-N	Averaging Time (Non-Cancer)	365	days	EPA, 1989	
				CF1	Conversion Factor 1	0.001	mg/µg	- -	
				CF2	Conversion Factor 2	0.001	l/cm^3	- -	

Appendix G
TABLE 4.3.RME
Values Used For Daily Intake Calculations
Reasonable Maximum Exposure
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name

(1) Professional Judgment based on construction activities that would result in contact with groundwater would occur 4 hrs per day for the RME.

(2) Assumed groundwater in open excavation would last 125 days per year

(3) Skin surface area in contact with groundwater assumed to be hands, forearms, lower legs, and feet.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa.

EPA, 2004 . Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment (Final). EPA/540/R/99/005. July 2004.

Appendix G
TABLE 4.4.RME
Values Used For Daily Intake Calculations
Reasonable Maximum Exposure
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Resident	Adult	Groundwater - Water Vapors at Showerhead	CW	Chemical Concentration in Water	See Table 3.3.RME	µg/l	See Table 3.3.RME	Chronic Daily Intake (CDI) (mg/m3) =
				CAa	Chemical Concentration in Air (Adult)	See Table 3.4.RME	mg/m^3	See Table 3.4.RME	CAa x ETa x EDa x EF x CF x 1/AT
				EF	Exposure Frequency	350	days/year	EPA, 1991	
				EDa	Exposure Duration (adult)	24	years	EPA, 1991	Use Foster & Chrostowski Shower model to
				ETa	Exposure Time (adult)	1	hr/day	EPA, 2004 (3)	calculate CAa
				CF	Conversion Factor	1/24	day/hour	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
		Child	Groundwater - Water Vapors at Showerhead	CW	Chemical Concentration in Water	See Table 3.3.RME	µg/l	See Table 3.3.RME	Chronic Daily Intake (CDI) (mg/m3) =
				CAc	Chemical Concentration in Air (Child)	See Table 3.4.RME	mg/m^3	See Table 3.4.RME	CA_c x ET_c x ED_c x EF x CF x 1/AT
				EF	Exposure Frequency	350	days/year	EPA, 1991	
				EDc	Exposure Duration (child)	6	years	EPA, 1991	Use Foster & Chrostowski Shower model to
				ETc	Exposure Time (child)	1.15	hr/day	EPA, 2004 (3)	calculate CAc
				CF	Conversion Factor	1/24	day/hour	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
		Child/Adult	Groundwater - Water Vapors at Showerhead	CW	Chemical Concentration in Water	See Table 3.3.RME	µg/l	See Table 3.3.RME	Chronic Daily Intake (CDI) (mg/m3) =
				CAa	Chemical Concentration in Air (Adult)	See Table 3.4.RME	mg/m^3	See Table 3.4.RME	(CAc x ETc x EDc + CAa x ETa x EDa) x EF x CF x 1/AT
				CAc	Chemical Concentration in Air (Child)	Calculated	mg/m^3	Calculated	
				EF	Exposure Frequency	350	days/year	EPA, 1991	
				EDa	Exposure Duration, Adult	24	years	EPA, 1991	Use Foster & Chrostowski Shower model to
				EDc	Exposure Duration, Child	6	years	EPA, 1991	calculate CAa and CAc
				ETa	Exposure Time (adult)	1	hr/day	EPA, 2004 (3)	
				ETc	Exposure Time (child)	1.15	hr/day	EPA, 2004 (3)	
				CF	Conversion Factor	1/24	day/hour	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	

Appendix G

TABLE 4.4.RME

Values Used For Daily Intake Calculations

Reasonable Maximum Exposure

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Construction Worker	Adult	Groundwater - Water Vapors at Excavation Pit	CW	Chemical Concentration in Water	See Table 3.3.RME	µg/l	See Table 3.3.RME	Chronic Daily Intake (CDI) (mg/m3) =
				CA	Chemical Concentration in Air	See Table 3.4.RME	mg/m^3	See Table 3.4.RME	CA x ET x EF x ED x CF x 1/AT
				ET	Exposure Time	8	hr/day	(1)	
				EF	Exposure Frequency	125	days/year	(2)	
				ED	Exposure Duration	1	years	EPA, 1991	CA calculated using two-film model
				CF	Conversion Factor	1/24	day/hour	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	EPA, 1989	

Notes:

(1) Professional judgment based on construction activities that would occur 8 hrs per day for the RME.

(2) Assumed groundwater in open excavation would last 125 days per year

(3) Assumed 35 minutes in shower plus 25 minutes in shower room for adult; 60 minutes in bath plus 10 minutes in bathroom for child

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 2004 . Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment (Final). EPA/540/R/99/005. July 2004.

Appendix F
TABLE 4.1.CTE
Values Used For Daily Intake Calculations
Central Tendency Exposure
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult	Soil*	CS	Chemical Concentration in Soil	See Table 3.1.CTE	mg/kg	See Table 3.1.CTE	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-S	Ingestion Rate of Soil	50	mg/day	EPA, 1993	CS x IR-S x EF x ED x CF x 1/BW x 1/AT
				EF	Exposure Frequency	234	days/year	EPA, 1993	
				ED	Exposure Duration	9	years	EPA, 2004	
				CF	Conversion Factor	0.000001	kg/mg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	
		Child	Soil*	CS	Chemical Concentration in Soil	See Table 3.1.CTE	mg/kg	See Table 3.1.CTE	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-S	Ingestion Rate of Soil	100	mg/day	EPA, 1993	CS x IR-S x EF x ED x CF x 1/BW x 1/AT
				EF	Exposure Frequency	234	days/year	EPA, 1993	
				ED	Exposure Duration	6	years	EPA, 1991	
				CF	Conversion Factor	0.000001	kg/mg	- -	
				BW	Body Weight	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
		Child/Adult	Soil*	CS	Chemical Concentration in Soil	See Table 3.1.CTE	mg/kg	See Table 3.1.CTE	Carcinogenic
				IR-Sa	Ingestion Rate of Soil-adult	50	mg/day	EPA, 1993	Chronic Daily Intake (CDI) (mg/kg-day) =
				EDa	Exposure Duration adult	9	years	EPA, 2004	CS x IR-S x EF x CF x 1/AT
				BWa	Body Weight adult	70	kg	EPA, 1991	
				IR-Sc	Ingestion Rate of Soil-child	100	mg/day	EPA, 1993	
				EDc	Exposure Duration child	6	years	EPA, 1993	IR-S = (EDc * IR-Sc/ BWc) +
				BWc	Body Weight child	15	kg	EPA, 1991	(EDa * IR-Sa/BWa)
				IR-S	Ingestion Rate of Soil-adjusted	46.43	mg-year/kg-day	- -	
				EF	Exposure Frequency	234	days/year	EPA, 1993	
				CF3	Conversion Factor 3	0.000001	kg/mg	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	

Appendix F
TABLE 4.1.CTE
Values Used For Daily Intake Calculations
Central Tendency Exposure
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Resident	Adult	Soil*	CS	Chemical Concentration in Soil	See Table 3.1.CTE	mg/kg	See Table 3.1.CTE	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	5,700	cm^2	EPA, 2004	CS x SA x SSAF x DABS x CF x EF x
				SSAF	Soil to Skin Adherence Factor	0.01	mg/cm^2-day	EPA, 2004	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	Chemical Specific	--	EPA, 2004	
				CF	Conversion Factor	0.000001	kg/mg	- -	
				EF	Exposure Frequency	234	days/year	EPA, 1993	
				ED	Exposure Duration	9	years	EPA, 2004	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	
		Child	Soil*	CS	Chemical Concentration in Soil	See Table 3.1.CTE	mg/kg	See Table 3.1.CTE	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	2,800	cm^2	EPA, 2004	CS x SA x SSAF x DABS x CF x EF x
				SSAF	Soil to Skin Adherence Factor	0.04	mg/cm^2-day	EPA, 2004	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	Chemical Specific	--	EPA, 2004	
				CF	Conversion Factor	0.000001	kg/mg	- -	
				EF	Exposure Frequency	234	days/year	EPA, 1993	
				ED	Exposure Duration	6	years	EPA, 1991	
				BW	Body Weight	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
Dermal	Resident	Child/Adult	Soil*	CS	Chemical Concentration in Soil	See Table 3.1.CTE	mg/kg	See Table 3.1.CTE	Carcinogenic CDI (mg/kg-day) =
				SAc	Skin Surface Area child	2,800	cm^2	EPA, 2004	CS x SA x DABS x CF x EF x 1/AT
				SSAFc	Soil to Skin Adherence Factor child	0.04	mg/cm^2-day	EPA, 2004	
				EDc	Exposure Duration child	6	years	EPA, 1991	SA =
				BWc	Body Weight child	15	kg	EPA, 1991	((EDc * SAc/BWc)*SSAFc) + ((EDa * SAa/BWa)*SSAFa)
				SAa	Skin Surface Area adult	5,700	cm^2	EPA, 2004	
				SSAFa	Soil to Skin Adherence Factor-adult	0.01	mg/cm^2-day	EPA, 2004	
				EDa	Exposure Duration adult	9	years	EPA, 2004	
				BWa	Body Weight adult	70	kg	EPA, 1991	
				SA	Skin Surface Area adjusted	52.13	cm^2-year/kg-day	---	
				DABS	Dermal Absorption Factor Solids	Chemical Specific	--	EPA, 2004	
				CF	Conversion Factor 3	0.000001	kg/mg	- -	
				EF	Exposure Frequency	234	days/year	EPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	

* Surface and subsurface soil combined.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 2004: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Appendix F
TABLE 4.2.CTE
Values Used For Daily Intake Calculations
Central Tendency Exposure
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Resident	Adult	Emissions from Soil*	CS	Chemical Concentration in Soil	See Table 3.1.CTE	mg/kg	See Table 3.1.CTE	Exposure Concentration (EC) (mg/m^3) =
				CA	Chemical Concentration in Air	See Table 3.2.CTE	mg/m^3	See Table 3.2.CTE	CA x ET x EF x ED x CF x 1/AT
				PEF	Particulate Emission Factor	1.36E+09	m^3/kg	EPA, 2002	
				VF	Volatilization Factor for volatile constituents	Calculated	m^3/kg	EPA, 2002	CA (mg/m^3) = CS (1/PEF + 1/VF)
				ET	Exposure Time	24	hour/day	--	
				EF	Exposure Frequency	234	days/year	EPA, 1993	
				ED	Exposure Duration	9	years	EPA, 2004	
				CF	Conversion Factor	1/24	day/hr	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	
		Child	Emissions from Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1.CTE	mg/kg	See Table 3.1.CTE	Exposure Concentration (EC) (mg/m^3) =
				CA	Chemical Concentration in Air	See Table 3.2.CTE	mg/m^3	See Table 3.2.CTE	CA x ET x EF x ED x CF x 1/AT
				PEF	Particulate Emission Factor	1.36E+09	m^3/kg	EPA, 2002	
				VF	Volatilization Factor for volatile constituents	Calculated	m^3/kg	EPA, 2002	CA (mg/m^3) = CS (1/PEF + 1/VF)
				ET	Exposure Time	24	hour/day	--	
				EF	Exposure Frequency	234	days/year	EPA, 1993	
				ED	Exposure Duration	6	years	EPA, 1991	
				CF	Conversion Factor	1/24	day/hr	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
		Child/Adult	Emissions from Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1.CTE	mg/kg	See Table 3.1.CTE	Exposure Concentration (EC) (mg/m^3) =
				CA	Chemical Concentration in Air	See Table 3.2.CTE	mg/m^3	See Table 3.2.CTE	CA x ET x EF x ED x CF x 1/AT
				PEF	Particulate Emission Factor	1.36E+09	m^3/kg	EPA, 2002	CA (mg/m^3) = CS (1/PEF + 1/VF)
				VF	Volatilization Factor for volatile constituents	Calculated	m^3/kg	EPA, 2002	
				EF	Exposure Frequency	234	days/year	EPA, 1993	
				ED	Exposure Duration	9	years	EPA, 2004	
				ET	Exposure Time	24	hr/day	EPA, 2009	
				CF	Conversion Factor	1/24	day/hr	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.
EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.
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EPA, 2004: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Appendix F
TABLE 4.3.CTE
Values Used For Daily Intake Calculations
Central Tendency Exposure
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult	Groundwater - Tap Water	CW	Chemical Concentration in Water	See Table 3.3.CTE	µg/l	See Table 3.3.CTE	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-W	Ingestion Rate of Water	1.4	liters/day	EPA, 1997	CW x IR-W x EF x ED x CF1 x 1/BW x 1/AT
				EF	Exposure Frequency	234	days/year	EPA, 1993	
				ED	Exposure Duration	9	years	EPA, 2004	
				CF1	Conversion Factor 1	0.001	mg/µg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	
		Child	Groundwater - Tap Water	CW	Chemical Concentration in Water	See Table 3.3.CTE	µg/l	See Table 3.3.CTE	CDI (mg/kg-day) =
				IR-W	Ingestion Rate of Water	1	liters/day	EPA, 1997	CW x IR-W x EF x ED x CF1 x 1/BW x 1/AT
				EF	Exposure Frequency	234	days/year	EPA, 1993	
				ED	Exposure Duration	6	years	EPA, 2004	
				CF1	Conversion Factor 1	0.001	mg/µg	- -	
				BW	Body Weight	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
		Child/Adult	Groundwater - Tap Water	CW	Chemical Concentration in Water	See Table 3.3.CTE	µg/l	See Table 3.3.CTE	CDI (mg/kg-day) =
				IR-W-A	Ingestion Rate of Water, Adult	1.4	liters/day	EPA, 1997	CW x IR-W-Adj x EF x CF1 x 1/AT
				IR-W-C	Ingestion Rate of Water, Child	1	liters/day	EPA, 1997	
				IR-W-Adj	Ingestion Rate of Water, Age-adjusted	0.58	liter-year/kg-day	calculated	IR-W-Adj (liter-year/kd-day) =
				EF	Exposure Frequency	234	days/year	EPA, 1993	(ED-C x IR-W-C / BW-C) +
				ED-A	Exposure Duration, Adult	9	years	EPA, 2004	(ED-A x IR-W-A / BW-A)
				ED-C	Exposure Duration	6	years	EPA, 2004	
				CF1	Conversion Factor 1	0.001	mg/µg	- -	
				BW-A	Body Weight , Adult	70	kg	EPA, 1991	
				BW-C	Body Weight, Child	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	

Appendix F
TABLE 4.3.CTE
Values Used For Daily Intake Calculations
Central Tendency Exposure
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Resident	Adult	Groundwater - Tap Water	CW	Chemical Concentration in Water	See Table 3.3.CTE	µg/l	See Table 3.3.CTE	CDI (mg/kg-day) =
				DAevent	Dermally Absorbed Dose per Event	Calculated	mg/cm^2-event	calculated	DAevent x SA x EV x EF x ED x 1/BW x 1/AT
				FA	Fraction absorbed water	Chemical specific	dimensionless	EPA, 2004	
				K_p	Permeability Coefficient	Chemical specific	cm/hr	EPA, 2004	Inorganics: DAevent (mg/cm^2-event) =
				τ	Lag Time	Chemical specific	hr/event	EPA, 2004	Kp x CW x t_{event} x CF1 x CF2
				t*	Time to Reach Steady-state	Chemical specific	hours	EPA, 2004	
				B	Ratio of Permeability of Stratum Corneum to Epidermis	Chemical specific	dimensionless	EPA, 2004	Organics :
				t_{event}	Event Time	0.25	hr/event	EPA, 2004	t_{event}<t*: DAevent (mg/cm^2-event) =
				SA	Skin Surface Area Available for Contact	18,000	cm^2	EPA, 2004	2 x FA x Kp x CW x (sqrt((6 x τ x t_{event})/π))
				EV	Event Frequency	1	events/day	EPA, 2004	x CF2 x CF3
				EF	Exposure Frequency	234	days/year	EPA, 1993	
				ED	Exposure Duration	9	years	EPA, 2004	t_{event}>t*: DAevent (mg/cm^2-event) =
				BW	Body Weight	70	kg	EPA, 1991	FA x Kp x CW x (t_{event}/(1+B) + 2 x τ
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	x ((1 + 3B + $3B^2$)/$(1+B)^2$)) x CF1 x CF2
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	
				CF1	Conversion Factor 1	0.001	mg/µg	- -	
				CF2	Conversion Factor 2	0.001	l/cm^3	- -	
		Child	Groundwater - Tap Water	CW	Chemical Concentration in Water	See Table 3.3.CTE	µg/l	See Table 3.3.CTE	CDI (mg/kg-day) =
				DAevent	Dermally Absorbed Dose per Event	Calculated	mg/cm^2-event	calculated	DAevent x SA x EV x EF x ED x 1/BW x 1/AT
				FA	Fraction absorbed water	Chemical specific	dimensionless	EPA, 2004	
				K_p	Permeability Coefficient	Chemical specific	cm/hr	EPA, 2004	Inorganics: DAevent (mg/cm^2-event) =
				τ	Lag Time	Chemical specific	hr/event	EPA, 2004	Kp x CW x t_{event} x CF2 x CF3
				t*	Time to Reach Steady-state	Chemical specific	hours	EPA, 2004	
				B	Ratio of Permeability of Stratum Corneum to Epidermis	Chemical specific	dimensionless	EPA, 2004	Organics :
				t_{event}	Event Time	0.33	hr/event	EPA, 2004	t_{event}<t*: DAevent (mg/cm^2-event) =
				SA	Skin Surface Area Available for Contact	6,600	cm^2	EPA, 2004	2 x FA x Kp x CW x (sqrt((6 x τ x t_{event})/π))
				EV	Event Frequency	1	events/day	EPA, 2004	x CF2 x CF3
				EF	Exposure Frequency	234	days/year	EPA, 1993	
				ED	Exposure Duration	6	years	EPA, 1991	t_{event}>t*: DAevent (mg/cm^2-event) =
				BW	Body Weight	15	kg	EPA, 1991	FA x Kp x CW x (t_{event}/(1+B) + 2 x τ

Appendix F
TABLE 4.3.CTE
Values Used For Daily Intake Calculations
Central Tendency Exposure
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	x $((1 + 3B + 3B^2)/(1+B)^2)$) x CF2 x CF3
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
				CF1	Conversion Factor 1	0.001	mg/µg	- -	
				CF2	Conversion Factor 2	0.001	l/cm^3	- -	
Dermal	Resident	Child/Adult	Groundwater - Tap Water	CW	Chemical Concentration in Water	See Table 3.3.CTE	µg/l	See Table 3.3.CTE	CDI (mg/kg-day) = DA-Adj x EF x 1/AT
				DAevent-A	Dermally Absorbed Dose per Event, Adult	Calculated	mg/cm^2-event	calculated	
				DAevent-C	Dermally Absorbed Dose per Event, Child	Calculated	mg/cm^2-event	calculated	DA-Adj = (DAevent-A x SA-A x ED-A x 1/BW-A)
				DA-Adj	Dermally Absorbed Dose, Age-adjusted	Calculated	mg-year/event-kg	calculated	+ (Daevent-C x SA-C x ED-C x 1/BW-C)
				FA	Fraction absorbed water	Chemical specific	dimensionless	EPA, 2004	
				K_p	Permeability Coefficient	Chemical specific	cm/hr	EPA, 2004	Inorganics: DAevent (mg/cm^2-event) =
				τ	Lag Time	Chemical specific	hr/event	EPA, 2004	Kp x CW x t_{event} x CF2 x CF3
				t*	Time to Reach Steady-state	Chemical specific	hours	EPA, 2004	
				B	Ratio of Permeability of Stratum Corneum to Epidermis	Chemical specific	dimensionless	EPA, 2004	Organics :
				t_{event}-A	Event Time, Adult	0.25	hr/event	EPA, 2004	t_{event}<t*: DAevent (mg/cm^2-event) =
				t_{event}-C	Event Time, Child	0.33	hr/event	EPA, 2004	2 x FA x Kp x CW x (sqrt((6 x τ x t_{event})/π))
				SA-A	Skin Surface Area, Adult	18,000	cm^2	EPA, 2004	x CF2 x CF3
				SA-C	Skin Surface Area, Child	6,600	cm^2	EPA, 2004	
				EV	Event Frequency	1	events/day	EPA, 2004	t_{event}>t*: DAevent (mg/cm^2-event) =
				EF	Exposure Frequency	234	days/year	EPA, 1993	FA x Kp x CW x (t_{event}/(1+B) + 2 x τ
				ED-A	Exposure Duration, Adult	9	years	EPA, 2004	x $((1 + 3B + 3B^2)/(1+B)^2)$) x CF2 x CF3
				ED-C	Exposure Duration, Child	6	years	EPA, 1991	
				BW-A	Body Weight, Adult	70	kg	EPA, 1991	
				BW-C	Body Weight, Child	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				CF1	Conversion Factor 1	0.001	mg/µg	- -	
				CF2	Conversion Factor 2	0.001	l/cm^3	- -	

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.
EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.
EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.
EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa.
EPA, 2004: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Appendix F
TABLE 4.3.CTE
Values Used For Daily Intake Calculations
Central Tendency Exposure
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Resident	Adult	Groundwater - Water Vapors at Showerhead	CW	Chemical Concentration in Water	See Table 3.4.CTE	µg/l	See Table 3.4.CTE	Chronic Daily Intake (CDI) (mg/m3) =
				CAa	Chemical Concentration in Air (Adult)	Calculated	mg/m^3	Calculated	CAa x ETa x EDa x EF x CF x 1/AT
				EF	Exposure Frequency	234	days/year	EPA, 1993	
				EDa	Exposure Duration (Adult)	9	years	EPA, 1993	Use Foster & Chrostowski Shower model to
				ETa	Exposure Time (Adult)	0.25	hr/day	EPA, 2004	calculate Caa
				CF	Conversion Factor	1/24	day/hour	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	
		Child	Groundwater - Water Vapors at Showerhead	CW	Chemical Concentration in Water	See Table 3.4.CTE	µg/l	See Table 3.4.CTE	Chronic Daily Intake (CDI) (mg/m3) =
				CAc	Chemical Concentration in Air (Child)	Calculated	mg/m^3	Calculated	CA_c x ET_c x ED_c x EF x CF x 1/AT
				EF	Exposure Frequency	234	days/year	EPA, 1993	
				EDc	Exposure Duration (Child)	6	years	EPA, 1991	Use Foster & Chrostowski Shower model to
				ETc	Exposure Time (Child)	0.33	hr/day	EPA, 2004	calculate Cac
				CF	Conversion Factor	1/24	day/hour	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
		Child/Adult	Groundwater - Water Vapors at Showerhead	CW	Chemical Concentration in Water	See Table 3.4.CTE	µg/l	See Table 3.4.CTE	Chronic Daily Intake (CDI) (mg/m3) =
				CAa	Chemical Concentration in Air (Adult)	Calculated	mg/m^3	Calculated	(CAc x ETc x EDc + CAa x ETa x EDa)
				CAc	Chemical Concentration in Air (Child)	Calculated	mg/m^3	Calculated	x EF x CF1 x 1/AT
				EF	Exposure Frequency	234	days/year	EPA, 1993	
				EDa	Exposure Duration, Adult	9	years	EPA, 1993	Use Foster & Chrostowski Shower model to
				EDc	Exposure Duration, Child	6	years	EPA, 1991	calculate CAa and CAc
				ETa	Exposure Time	0.25	hr/day	EPA, 2004	
				ETc	Exposure Time	0.33	hr/day	EPA, 2004	
				CF	Conversion Factor	1/24	day/hour	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	

Notes:

(1) Professional judgment assuming 1/2 reasonable maxium exposure (RME) value for central tendeny exposure (CTE).

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 2004 . Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment (Final). EPA/540/R/99/005. July 2004.

Appendix F

TABLE 5.1.RME

Non-Cancer Toxiciy Data -- Oral/Dermal

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD Value	Oral RfD Units	Oral to Dermal Adjustment Factor (1)	Adjusted Dermal RfD (2)	Units	Primary Target Organ	Combined Uncertainty/Modifying Factors	Sources of RfD: Target Organ	Dates of RfD: Target Organ (3) (MM/DD/YY)
1,1,2,2-Tetrachloroethane	Chronic	2.0E-02	mg/kg-day	Generally > 50%	2.0E-02	mg/kg-day	Liver	1000/1	IRIS	7/11/2011
	Subchronic	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-Trichloroethane	Chronic	4.0E-03	mg/kg-day	Generally > 50%	4.0E-03	mg/kg-day	Blood	1000/1	IRIS	7/11/2011
	Subchronic	4.0E-03	mg/kg-day	Generally > 50%	4.0E-03	mg/kg-day	Liver, Immune System	1000	PPRTV	4/01/2011
1,2-Dichloroethane	Chronic	6.0E-03	mg/kg-day	Generally > 50%	6.0E-03	mg/kg-day	Kidney	10000	PPRTV	10/01/2010
	Subchronic	2.0E-02	mg/kg-day	Generally > 50%	2.0E-02	mg/kg-day	Kidney	3000	PPRTV	10/01/2010
Benzene	Chronic	4.0E-03	mg/kg-day	Generally > 50%	4.0E-03	mg/kg-day	Blood, Immune	300/1	IRIS	7/11/2011
	Subchronic	1.0E-02	mg/kg-day	Generally > 50%	1.0E-02	mg/kg-day	Blood, Immune	100	PPRTV	9/29/2009
Chloroform	Chronic	1.0E-02	mg/kg-day	Generally > 50%	1.0E-02	mg/kg-day	Liver, Blood	100/1	IRIS	7/11/2011
	Subchronic	1.0E-02	mg/kg-day	Generally > 50%	1.0E-02	mg/kg-day	Liver	1000	HEAST	7/1997
cis-1,2-Dichloroethene	Chronic	2.0E-03	mg/kg-day	Generally > 50%	2.0E-03	mg/kg-day	Kidney	3000/1	IRIS	7/11/2011
	Subchronic	2.0E-02	mg/kg-day	Generally > 50%	2.0E-02	mg/kg-day	Kidney	300	PPRTV	2/03/2011
Tetrachloroethene	Chronic	1.0E-02	mg/kg-day	Generally > 50%	1.0E-02	mg/kg-day	Liver	1000/1	IRIS	7/11/2011
	Subchronic	1.0E-01	mg/kg-day	Generally > 50%	1.0E-01	mg/kg-day	Liver	100	HEAST	7/1997
trans-1,2-Dichloroethene	Chronic	2.0E-02	mg/kg-day	Generally > 50%	2.0E-02	mg/kg-day	Blood	3000/1	IRIS	7/12/2011
	Subchronic	2.0E-01	mg/kg-day	Generally > 50%	2.0E-01	mg/kg-day	Blood	100	HEAST	7/1997
Trichloroethene	Chronic	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Subchronic	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl chloride	Chronic	3.0E-03	mg/kg-day	Generally > 50%	3.0E-03	mg/kg-day	Liver	30/1	IRIS	7/12/2011
	Subchronic	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aluminum	Chronic	1.0E+00	mg/kg-day	Generally > 50%	1.0E+00	mg/kg-day	Neurotoxicity	100	PPRTV	10/23/2006
	Subchronic	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	Chronic	3.0E-04	mg/kg-day	95%	3.0E-04	mg/kg-day	Skin, Vascular	3/1	IRIS	7/12/2011
	Subchronic	3.0E-04	mg/kg-day	95%	3.0E-04	mg/kg-day	Skin, Vascular	3	HEAST	7/01/1997
Chromium	Chronic	3.0E-03	mg/kg-day	2.5%	7.5E-05	mg/kg-day	Not identified	300/3	IRIS	7/12/2011
	Subchronic	2.0E-02	mg/kg-day	2.5%	5.0E-04	mg/kg-day	Not identified	100	HEAST	7/01/1997
Iron	Chronic	7.0E-01	mg/kg-day	Generally > 50%	7.0E-01	mg/kg-day	GI System	1.5	PPRTV	9/11/2006
	Subchronic	7.0E-01	mg/kg-day	Generally > 50%	7.0E-01	mg/kg-day	GI System	1.5	PPRTV	9/11/2006
Vanadium	Chronic	5.0E-03	mg/kg-day	100%	5.0E-03	mg/kg-day	Hair	100/1	IRIS (RSL)	7/12/2011
	Subchronic	7.0E-03	mg/kg-day	100%	7.0E-03	mg/kg-day	Lifetime	100	HEAST	7/01/1997

(1) Source: Risk Assessment Guidance for Superfund. Volume 1: Human Health Evolution Manual (Part E, Supplemental Guidance for Dermal Risk Assessment). Final.
Section 4.2 and Exhibit 4-1. USEPA recommends that the oral RfD should not be adjusted to estimate the absorbed dose for compounds when the absorption efficiency is greater than 50%.
Constituents that do not have oral absorption efficiencies reported on this table were assumed to have an oral absorption efficiency of 100%.

(2) Adjusted Dermal RfD = RfD (oral) x Absorption Efficiency or ABS_{GI}

(3) For IRIS values, provide the date IRIS was searched.
For HEAST values, provide the date of HEAST.
For PPRTV values, provide the date of the article provided by National Center for Exposure Assessment.
For RSL values, the date of the RSL Table.

Toxicity values for hexavalent chromium used as surrogate for chromium.

Definitions:
CNS = Central Nervous System
GI = Gastroinestinal
HEAST= Health Effects Assessment Summary Tables
IRIS = Integrated Risk Information System
NA = Not available/not applicable
PPRTV = Provisional Peer-Reviewed Toxicity Values
RSL = Regional Screening Level Table

Appendix F

TABLE 5.2.RME

Non-Cancer Toxicity Data -- Inhalation

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Chemical of Potential Concern	Chronic/ Subchronic	Value Inhalation RfC	Units	Primary Target Organ	Combined Uncertainty/Modifying Factors	Sources of RfC:RfD: Target Organ	Dates (1) (MM/DD/YY)
1,1,2,2-Tetrachloroethane	Chronic	NA	NA	NA	NA	NA	NA
	Subchronic	NA	NA	NA	NA	NA	NA
1,1,2-Trichloroethane	Chronic	2.0E-04	mg/m^3	Liver	300	PPRTV	4/01/2011
	Subchronic	2.0E-03	mg/m^3	Liver, Respiratory	300	PPRTV	4/01/2011
1,2-Dichloroethane	Chronic	7.0E-03	mg/m^3	Neurological	3000	PPRTV	10/01/2010
	Subchronic	7.0E-02	mg/m^3	Neurological	300	PPRTV	10/01/2010
Benzene	Chronic	3.0E-02	mg/m^3	Blood, Immune	300/1	IRIS	7/11/2011
	Subchronic	8.0E-02	mg/m^3	Blood, Immune	100	PPRTV	9/29/2009
Chloroform	Chronic	9.8E-02	mg/m^3	Liver	100	ATSDR	9/01/1997
	Subchronic	NA	NA	NA	NA	NA	NA
cis-1,2-Dichloroethene	Chronic	NA	NA	NA	NA	NA	NA
	Subchronic	NA	NA	NA	NA	NA	NA
Tetrachloroethene	Chronic	2.7E-01	mg/m^3	Neurological	100	ATSDR	9/01/1997
	Subchronic	NA	NA	NA	NA	NA	NA
trans-1,2-Dichloroethene	Chronic	6.0E-02	mg/m^3	Lung, Liver	3000	PPRTV	3/01/2006
	Subchronic	NA	NA	NA	NA	NA	NA
Trichloroethene	Chronic	1.0E-02	mg/m^3	NA	NA	NY (RSL)	10/20/2004
	Subchronic	NA	NA	NA	NA	NA	NA
Vinyl chloride	Chronic	1.0E-01	mg/m^3	Liver	30/1	IRIS	7/12/2011
	Subchronic	NA	NA	NA	NA	NA	NA
Aluminum	Chronic	5.0E-03	mg/m^3	Neurotoxicity	300	PPRTV	10/23/2006
	Subchronic	NA	NA	NA	NA	NA	NA
Arsenic	Chronic	1.5E-05	mg/m^3	Developmental, Cardiovascular, Nervous System	3/1	Cal EPA	7/12/2011
	Subchronic	NA	NA	NA	NA	NA	NA
Chromium	Chronic	1.0E-04	mg/m^3	Respiratory System	300/1	IRIS	7/12/2011
	Subchronic	NA	NA	NA	NA	NA	NA
Iron	Chronic	NA	NA	NA	NA	NA	NA
	Subchronic	NA	NA	NA	NA	NA	NA
Vanadium	Chronic	NA	NA	NA	NA	NA	NA
	Subchronic	NA	NA	NA	NA	NA	NA

(1) For IRIS values, the date IRIS was searched.
For Cal EPA values, provide the date Cal EPA database was searched.
For PPRTV values, provide the date of the article provided by National Center for Exposure Assessment.
For ATSDR values, the date of the ATSDR toxicity profile
For NY values, the date of the NY EPA toxicity profile
Toxicity values for hexavalent chromium used as surrogate for chromium.

ATSDR MRL = Agency for Toxic Substances & Disease Registry Minimal Risk Levels
Cal EPA = California EPA
IRIS = Integrated Risk Information System
NA = Not Applicable or Not Available.
NY = New York EPA
PPRTV = Provisional Peer-Reviewed Toxicity Values
RSL = Regional Screening Level Table

Appendix F

TABLE 6.1.RME

Cancer Toxiciy Data -- Oral/Dermal

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Chemical of Potential Concern	Oral Cancer Slope Factor	Oral to Dermal Adjustment Factor	Adjusted Dermal Cancer Slope Factor (1)	Units	EPA Carcinogen Group	Source	Date (2) (MM/DD/YY)
1,1,2,2-Tetrachloroethane	2.0E-01	Generally > 50%	2.0E-01	$(mg/kg\text{-}day)^{-1}$	Likely to be carcinogenic to humans	IRIS	7/11/2011
1,1,2-Trichloroethane	5.7E-02	Generally > 50%	5.7E-02	$(mg/kg\text{-}day)^{-1}$	C	IRIS	7/11/2011
1,2-Dichloroethane	9.1E-02	Generally > 50%	9.1E-02	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	7/11/2011
Benzene	5.5E-02	Generally > 50%	5.5E-02	$(mg/kg\text{-}day)^{-1}$	A	IRIS	7/11/2011
Chloroform	3.1E-02	Generally > 50%	3.1E-02	$(mg/kg\text{-}day)^{-1}$	B2	Cal/EPA	7/11/2011
cis-1,2-Dichloroethene	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethene	5.4E-01	Generally > 50%	5.4E-01	$(mg/kg\text{-}day)^{-1}$	2A	Cal/EPA	7/11/2011
trans-1,2-Dichloroethene	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	5.9E-03	Generally > 50%	5.9E-03	$(mg/kg\text{-}day)^{-1}$	2A	CalEPA	7/12/2011
Vinyl chloride (3) (ages 0 - 6)	1.5E+00	Generally > 50%	1.5E+00	$(mg/kg\text{-}day)^{-1}$	A	IRIS	7/12/2011
Vinyl chloride (3) (ages 6 - 30)	7.2E-01	Generally > 50%	7.2E-01	$(mg/kg\text{-}day)^{-1}$	A	IRIS	7/12/2011
Aluminum	NA	NA	NA	NA	NA	NA	NA
Arsenic	1.5E+00	95%	1.5E+00	$(mg/kg\text{-}day)^{-1}$	A	IRIS	7/12/2011
Chromium (3)	5.0E-01	2.5%	2.0E+01	$(mg/kg\text{-}day)^{-1}$	D	New Jersey	7/12/2011
Iron	NA	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA	NA	NA

NA = Not available/not applicable
IRIS = Integrated Risk Information System
Cal EPA = California EPA
New Jersey = New Jersey EPA

(1) Refer to RAGS, Part E. July 2004.
USEPA recommends that the oral RfD should not be adjusted to estimate the absorbed dose for compounds when the absorption efficiency is greater than 5(
Adjusted Dermal SF = SF (oral) x Absorption Efficiency or ABS_{GI}

(2) For IRIS values, provide the date IRIS was searched.
For Cal EPA values, provide the date Cal EPA database was searched.

EPA Carcinogen Group:
A - Human carcinogen
B1 - Probable human carcinogen - indicates that limited human data are available
B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans
C - Possible human carcinogen
D - Not classifiable as a human carcinogen

IARC Classification
2A - The agent is probably carcinogenic to humans

(3) This chemical operates with a mutagenic mode of action. Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens. EPA/630/R-03/003F. March 2005(USEPA 2005).
Chemical-specific data are not available, thus, USEPA (2005) default age-dependant adjustment factors (ADAF) will be applied to the slope factor as follows:

AGE	AGE ADAF
0-<2	10
2-<16	3
16-<30	1

Toxicity values for hexavalent chromium used as surrogate for chromium.

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TABLE 6.2.RME

Cancer Toxiciy Data -- Inhalation

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Chemical of Potential Concern	Unit Risk	Units	Weight of Evidence/ Cancer Guidance Description	Source	Date (2) (MM/DD/YY)
1,1,2,2-Tetrachloroethane	5.8E-05	$(\mu g/m^3)^{-1}$	Likely to be carcinogenic to humans	Ca/IEPA	7/11/2011
1,1,2-Trichloroethane	1.6E-05	$(\mu g/m^3)^{-1}$	C	IRIS	7/11/2011
1,2-Dichloroethane	2.6E-05	$(\mu g/m^3)^{-1}$	B2	IRIS	7/11/2011
Benzene	7.8E-06	$(\mu g/m^3)^{-1}$	A	IRIS	7/11/2011
Chloroform	2.3E-05	$(\mu g/m^3)^{-1}$	B2	IRIS	7/11/2011
cis-1,2-Dichloroethene	NA	NA	NA	NA	NA
Tetrachloroethene	5.9E-06	$(\mu g/m^3)^{-1}$	2A	Ca/IEPA	7/11/2011
trans-1,2-Dichloroethene	NA	NA	NA	NA	NA
Trichloroethene	2.0E-06	$(\mu g/m^3)^{-1}$	2A	Ca/IEPA	7/12/2011
Vinyl chloride (3) (ages 0 - 6)	8.8E-06	$(\mu g/m^3)^{-1}$	A	IRIS	7/12/2011
Vinyl chloride (3) (ages 6 - 30)	4.4E-06	$(\mu g/m^3)^{-1}$	A	IRIS	7/12/2011
Aluminum	NA	NA	NA	NA	NA
Arsenic	4.3E-03	$(\mu g/m^3)^{-1}$	A	IRIS	7/12/2011
Chromium (VI) (3)	8.4E-02	$(\mu g/m3)^{-1}$	A	IRIS	7/12/2011
Iron	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA

IRIS = Integrated Risk Information System

Cal EPA = California EPA

NA = Not available/not applicable

(2) For IRIS values, provide the date IRIS was searched.
For Cal EPA values, provide the date Cal EPA database was searched.

(3) This chemical operates with a mutagenic mode of action (USEPA 2005).

Toxicity values for hexavalent chromium used as surrogate for chromium.

EPA Group:

A - Human carcinogen

B1 - Probable human carcinogen - indicates that limited human data are available

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

IARC Classification

2A - The agent is probably carcinogenic to humans

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TABLE 7.1.RME Supplement A

Calculation of Chemical Cancer Risks and Non-Cancer Hazards

Site 49

MCIEAST-MCB CAMLEJ
North Carolina

Chemical of Potential Concern	Water Concentration (CW) (µg/L)	Permeability Coefficient (Kp) (cm/hr)	B (dimensionless)	Lag Time (τ_{event}) (hr)	t* (hr)	Fraction Absorbed Water (FA) (dimensionless)	Duration of Event (tevent) (hr)	DAevent (mg/cm^2-event)	Eq
1,1,2,2-Tetrachloroethane	7.9E+01	6.9E-03	3.5E-02	9.3E-01	2.2E+00	1.0E+00	0.58	1.1E-06	2
1,1,2-Trichloroethane	2.5E+00	6.4E-03	2.9E-02	6.0E-01	1.4E+00	1.0E+00	0.58	2.6E-08	2
1,2-Dichloroethane	5.3E-01	4.2E-03	1.6E-02	3.8E-01	9.2E-01	1.0E+00	0.58	2.9E-09	2
Benzene	1.3E+00	1.5E-02	5.1E-02	2.9E-01	7.0E-01	1.0E+00	0.58	2.1E-08	2
Chloroform	3.9E-01	6.8E-03	2.9E-02	5.0E-01	1.2E+00	1.0E+00	0.58	4.0E-09	2
cis-1,2-Dichloroethene[1]	1.2E+02	7.7E-03	2.9E-02	3.7E-01	8.9E-01	1.0E+00	0.58	1.1E-06	2
Tetrachloroethene	9.2E-01	3.3E-02	1.7E-01	9.1E-01	2.2E+00	1.0E+00	0.58	6.2E-08	2
trans-1,2-Dichloroethene	5.2E+01	7.7E-03	2.9E-02	3.7E-01	8.9E-01	1.0E+00	0.58	5.1E-07	2
Trichloroethene	1.1E+02	1.2E-02	5.1E-02	5.8E-01	1.4E+00	1.0E+00	0.58	2.1E-06	2
Vinyl chloride	1.0E+01	5.6E-03	1.7E-02	2.4E-01	5.7E-01	1.0E+00	0.58	6.1E-08	3

Inorganics: DA_{event} (mg/cm^2-event) =
K_p x CW x t_{event} x 0.001 mg/µg x 0.001 l/cm^3 (eq 1)

Organics: DA_{event} (mg/cm^2-event) =
If $t_{event} < t^*$, then DA_{event} =
2 x FA x K_p x CW x (sqrt((6 x τ_{event} x t_{event})/π)) x 0.001 mg/µg x 0.001 l/cm^3 (eq 2)

If $t_{event} > t^*$, then DA_{event} =
FA x K_p x CW x (t_{event}/(1+B) + 2 x τ_{event} x ((1 + 3xB + 3xB^2)/(1+B)^2) x 0.001 mg/µg x 0.001 l/cm^3 (eq 3)

Notes:
[1] trans-1,2-Dichloroethene values used as surrogate.
Parameter values from EPA 2004, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment - Final).* EPA/540/R/99/005.
B - Dimensionless ratio of the permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis (dimensionless).
t* - Time to reach steady-state

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TABLE 7.1.RME

Calculation of Chemical Cancer Risks and Non-Cancer Hazards

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Soil*	Soil*	Ingestion	Aluminum	1.7E+04	mg/kg	N/A		N/A		N/A	2.3E-02	mg/kg-day	1.0E+00	mg/kg-day	2.3E-02
				Arsenic	6.8E+00	mg/kg	N/A		N/A		N/A	9.3E-06	mg/kg-day	3.0E-04	mg/kg-day	3.1E-02
				Chromium	2.8E+01	mg/kg	N/A		N/A		N/A	3.8E-05	mg/kg-day	3.0E-03	mg/kg-day	1.3E-02
				Iron	1.8E+04	mg/kg	N/A		N/A		N/A	2.5E-02	mg/kg-day	7.0E-01	mg/kg-day	3.6E-02
				Vanadium	4.1E+01	mg/kg	N/A		N/A		N/A	5.6E-05	mg/kg-day	5.0E-03	mg/kg-day	1.1E-02
			Exp. Route Total								N/A					1.1E-01
			Dermal Absorption[1]	Aluminum	1.7E+04	mg/kg	N/A		N/A		N/A	9.3E-05	mg/kg-day	1.0E+00	mg/kg-day	9.3E-05
				Arsenic	6.8E+00	mg/kg	N/A		N/A		N/A	1.1E-06	mg/kg-day	3.0E-04	mg/kg-day	3.7E-03
				Chromium	2.8E+01	mg/kg	N/A		N/A		N/A	1.5E-07	mg/kg-day	7.5E-05	mg/kg-day	2.0E-03
				Iron	1.8E+04	mg/kg	N/A		N/A		N/A	1.0E-04	mg/kg-day	7.0E-01	mg/kg-day	1.4E-04
				Vanadium	4.1E+01	mg/kg	N/A		N/A		N/A	2.2E-07	mg/kg-day	5.0E-03	mg/kg-day	4.4E-05
			Exp. Route Total								N/A					6.0E-03
		Exposure Point Total									N/A					1.2E-01
	Exposure Medium Total										N/A					1.2E-01
	Air	Emissions from Soil*	Inhalation	Chromium	2.1E-05	µg/m³	N/A		N/A		N/A	2.0E-08	mg/m³	1.0E-04	mg/m³	2.0E-04
			Exp. Route Total								N/A					2.0E-04
		Exposure Point Total									N/A					2.0E-04
	Exposure Medium Total										N/A					2.0E-04
Soil* Total											N/A					1.2E-01
Groundwater	Groundwater	Tap Water	Ingestion	1,1,2,2-Tetrachloroethane	7.9E+01	µg/L	N/A		N/A		N/A	2.2E-03	mg/kg-day	2.0E-02	mg/kg-day	1.1E-01
				1,1,2-Trichloroethane	2.5E+00	µg/L	N/A		N/A		N/A	6.9E-05	mg/kg-day	4.0E-03	mg/kg-day	1.7E-02
				1,2-Dichloroethane	5.3E-01	µg/L	N/A		N/A		N/A	1.5E-05	mg/kg-day	6.0E-03	mg/kg-day	2.4E-03
				Benzene	1.3E+00	µg/L	N/A		N/A		N/A	3.5E-05	mg/kg-day	4.0E-03	mg/kg-day	8.7E-03
				Chloroform	3.9E-01	µg/L	N/A		N/A		N/A	1.1E-05	mg/kg-day	1.0E-02	mg/kg-day	1.1E-03
				cis-1,2-Dichloroethene	1.2E+02	µg/L	N/A		N/A		N/A	3.2E-03	mg/kg-day	2.0E-03	mg/kg-day	1.6E+00
				Tetrachloroethene	9.2E-01	µg/L	N/A		N/A		N/A	2.5E-05	mg/kg-day	1.0E-02	mg/kg-day	2.5E-03
				trans-1,2-Dichloroethene	5.2E+01	µg/L	N/A		N/A		N/A	1.4E-03	mg/kg-day	2.0E-02	mg/kg-day	7.1E-02
				Trichloroethene	1.1E+02	µg/L	N/A		N/A		N/A	3.0E-03	mg/kg-day	N/A	N/A	N/A
				Vinyl chloride	1.0E+01	µg/L	N/A		N/A		N/A	2.8E-04	mg/kg-day	3.0E-03	mg/kg-day	9.5E-02
			Exp. Route Total								N/A					1.9E+00
			Dermal Absorption[2]	1,1,2,2-Tetrachloroethane	7.9E+01	µg/L	N/A		N/A		N/A	2.7E-04	mg/kg-day	2.0E-02	mg/kg-day	1.4E-02
				1,1,2-Trichloroethane	2.5E+00	µg/L	N/A		N/A		N/A	6.5E-06	mg/kg-day	4.0E-03	mg/kg-day	1.6E-03
				1,2-Dichloroethane	5.3E-01	µg/L	N/A		N/A		N/A	7.2E-07	mg/kg-day	6.0E-03	mg/kg-day	1.2E-04
				Benzene	1.3E+00	µg/L	N/A		N/A		N/A	5.3E-06	mg/kg-day	4.0E-03	mg/kg-day	1.3E-03

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TABLE 7.1.RME

Calculation of Chemical Cancer Risks and Non-Cancer Hazards

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC Value	EPC Units	Cancer Risk Calculations: Intake/Exposure Concentration Value	Intake/Exposure Concentration Units	CSF/Unit Risk Value	CSF/Unit Risk Units	Cancer Risk	Non-Cancer Hazard Calculations: Intake/Exposure Concentration Value	Intake/Exposure Concentration Units	RfD/RfC Value	RfD/RfC Units	Hazard Quotient
				Chloroform	3.9E-01	µg/L	N/A		N/A		N/A	9.7E-07	mg/kg-day	1.0E-02	mg/kg-day	9.7E-05
				cis-1,2-Dichloroethene	1.2E+02	µg/L	N/A		N/A		N/A	2.8E-04	mg/kg-day	2.0E-03	mg/kg-day	1.4E-01
				Tetrachloroethene	9.2E-01	µg/L	N/A		N/A		N/A	1.5E-05	mg/kg-day	1.0E-02	mg/kg-day	1.5E-03
				trans-1,2-Dichloroethene	5.2E+01	µg/L	N/A		N/A		N/A	1.3E-04	mg/kg-day	2.0E-02	mg/kg-day	6.3E-03
				Trichloroethene	1.1E+02	µg/L	N/A		N/A		N/A	5.1E-04	mg/kg-day	N/A	N/A	N/A
				Vinyl chloride	1.0E+01	µg/L	N/A		N/A		N/A	1.5E-05	mg/kg-day	3.0E-03	mg/kg-day	5.0E-03
			Exp. Route Total								N/A					1.7E-01
		Exposure Point Total									N/A					2.1E+00
	Exposure Medium Total										N/A					2.1E+00
	Air	Water Vapors at Showerhead	Inhalation[3]	1,1,2,2-Tetrachloroethane	7.9E+01	µg/L	N/A		N/A		N/A	3.6E-03	mg/m^3	N/A		N/A
				1,1,2-Trichloroethane	2.5E+00	µg/L	N/A		N/A		N/A	1.6E-04	mg/m^3	2.0E-04	mg/m^3	8.2E-01
				1,2-Dichloroethane	5.3E-01	µg/L	N/A		N/A		N/A	4.3E-05	mg/m^3	7.0E-03	mg/m^3	6.1E-03
				Benzene	1.3E+00	µg/L	N/A		N/A		N/A	1.3E-04	mg/m^3	3.0E-02	mg/m^3	4.3E-03
				Chloroform	3.9E-01	µg/L	N/A		N/A		N/A	3.2E-05	mg/m^3	9.8E-02	mg/m^3	3.3E-04
				cis-1,2-Dichloroethene	1.2E+02	µg/L	N/A		N/A		N/A	1.1E-02	mg/m^3	N/A		N/A
				Tetrachloroethene	9.2E-01	µg/L	N/A		N/A		N/A	6.8E-05	mg/m^3	2.7E-01	mg/m^3	2.5E-04
				trans-1,2-Dichloroethene	5.2E+01	µg/L	N/A		N/A		N/A	4.8E-03	mg/m^3	6.0E-02	mg/m^3	7.9E-02
				Trichloroethene	1.1E+02	µg/L	N/A		N/A		N/A	9.1E-03	mg/m^3	1.0E-02	mg/m^3	9.1E-01
				Vinyl chloride	1.0E+01	µg/L	N/A		N/A		N/A	1.2E-03	mg/m^3	1.0E-01	mg/m^3	1.2E-02
			Exp. Route Total								N/A					1.8E+00
		Exposure Point Total									N/A					1.8E+00
	Exposure Medium Total										N/A					1.8E+00
Groundwater Total											N/A					3.9E+00
							Total of Receptor Risks Across All Media				N/A	Total of Receptor Hazards Across All Media				4.0E+00

Notes:

* Soil = combined surface and subsurface soil.

1. Dermal absorption factors (DABs) used to calculated dermal absorption intake from soil are chemical specific. DABS of 0.03 used for arsenic, and 0.001 for rest of metals.

2. Dermal absorption from groundwater calculated on Table 7.1.RME Supplement A.

3. Inhalation exposure while showering calculated on Table 7.1.RME Supplement B

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TABLE 7.1.RME Supplement B

Calculation of Chemical Cancer Risks and Non-Cancer Hazards

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Chemical of Potential Concern	Exposure Point Concentration Cwo (µg/L)	Molecular weight (MW) (g/mole)	Henry's Law Constant (H) (atm-m^3/mole)	Kg (VOC) (cm/hr)	Kl (VOC) (cm/hr)	KL (cm/hr)	Kal (cm/hr)	Cwd (µg/L)	S (µg/m^3 -min)	Ca (mg/m^3)
1,1,2,2-Tetrachloroethane	7.9E+01	1.7E+02	3.7E-04	9.8E+02	1.0E+01	6.1E+00	8.2E+00	5.2E+00	4.3E+00	8.9E-02
1,1,2-Trichloroethane	2.5E+00	1.3E+02	8.2E-04	1.1E+03	1.1E+01	8.8E+00	1.2E+01	2.4E-01	2.0E-01	4.1E-03
1,2-Dichloroethane	5.3E-01	9.9E+01	1.2E-03	1.3E+03	1.3E+01	1.1E+01	1.5E+01	6.2E-02	5.2E-02	1.1E-03
Benzene	1.3E+00	7.8E+01	5.6E-03	1.4E+03	1.5E+01	1.4E+01	1.9E+01	1.9E-01	1.6E-01	3.3E-03
Chloroform	3.9E-01	1.2E+02	3.7E-03	1.2E+03	1.2E+01	1.1E+01	1.5E+01	4.7E-02	3.9E-02	8.1E-04
cis-1,2-Dichloroethene	1.2E+02	9.7E+01	4.1E-03	1.3E+03	1.3E+01	1.3E+01	1.7E+01	1.5E+01	1.3E+01	2.7E-01
Tetrachloroethene	9.2E-01	1.7E+02	1.8E-02	9.9E+02	1.0E+01	1.0E+01	1.4E+01	1.0E-01	8.3E-02	1.7E-03
trans-1,2-Dichloroethene	5.2E+01	9.7E+01	4.1E-03	1.3E+03	1.3E+01	1.3E+01	1.7E+01	6.9E+00	5.8E+00	1.2E-01
Trichloroethene	1.1E+02	1.3E+02	9.9E-03	1.1E+03	1.2E+01	1.1E+01	1.5E+01	1.3E+01	1.1E+01	2.3E-01
Vinyl chloride	1.0E+01	6.3E+01	2.8E-02	1.6E+03	1.7E+01	1.7E+01	2.2E+01	1.8E+00	1.5E+00	3.0E-02

Variables	Units	Exposure Assumptions
Kg(VOC) = gas-film mass transfer coefficient	cm/hr	Solved by Eq 1
Kl(VOC) = liquid-film mass transfer coefficient	cm/hr	Solved by Eq 2
KL = overall mass transfer coefficient	cm/hr	Solved by Eq 3
Kal = adjusted overall mass transfer coeff.	cm/hr	Solved by Eq 4
Tl = Calibration temp. of water	K (20C +273)	293
Ts = Shower water temperature	k (45C)	318
Us = water viscosity at Ts	centipoise	0.596
Ul = water viscosity at Tl	cp	1.002
Cwd = conc. leaving droplets after time sdt	µg/l	Solved by Eq 5
sdt = shower droplet drop time	sec	0.5
d = shower droplet diameter	mm	1
FR = shower water flow rate	l/min	10
SV = shower room air volume	m^3	12
S = indoor VOC generation rate	µg/m^3-min	Solved by Eq 6
Ds = duration of shower	min	34.8
Dt = total duration in shower room	min	60
R = air exchange rate	min^{-1}	0.0083
Ca = indoor air concentration of VOCs	µg/m^3	Solved by Eq 7

Equation 1:	Kg(VOC) =	$3000 * (18 / MW)^{0.5}$	
Equation 2:	Kl(VOC) =	$20 * (44 / MW)^{0.5}$	
Equation 3:	KL =	$((1 / Kl(VOC)) + (0.024 / (Kg (VOC) * H)))^{-1}$	
Equation 4:	Kal =	$(KL * (((Tl * Us) / (Ts * Ul))^{-0.5}))$	
Equation 5:	Cwd =	(Cwo * (1-EXP((-1 * Kal * sdt)/(60 * d))))	
Equation 6:	S =	(Cwd * FR / SV)	
Equation 7:	Ca =	If t>Ds	[(S / R) * (Ds + (EXP(-R * Dt) / R) -(EXP(R *(Ds - Dt)) / R)] / Dt * 1/1000

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TABLE 7.2.RME

Calculation of Chemical Cancer Risks and Non-Cancer Hazards

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC Value	EPC Units	Cancer Risk Calculations: Intake/Exposure Concentration Value	Intake/Exposure Concentration Units	CSF/Unit Risk Value	CSF/Unit Risk Units	Cancer Risk	Non-Cancer Hazard Calculations: Intake/Exposure Concentration Value	Intake/Exposure Concentration Units	RfD/RfC Value	RfD/RfC Units	Hazard Quotient
Soil*	Soil*	Soil*	Ingestion	Aluminum	1.7E+04	mg/kg	N/A		N/A		N/A	2.2E-01	mg/kg-day	1.0E+00	mg/kg/day	2.2E-01
				Arsenic	6.8E+00	mg/kg	N/A		N/A		N/A	8.7E-05	mg/kg-day	3.0E-04	mg/kg/day	2.9E-01
				Chromium	2.8E+01	mg/kg	N/A		N/A		N/A	3.6E-04	mg/kg-day	3.0E-03	mg/kg/day	1.2E-01
				Iron	1.8E+04	mg/kg	N/A		N/A		N/A	2.4E-01	mg/kg-day	7.0E-01	mg/kg/day	3.4E-01
				Vanadium	4.1E+01	mg/kg	N/A		N/A		N/A	5.2E-04	mg/kg-day	5.0E-03	mg/kg/day	1.0E-01
			Exp. Route Total								N/A					1.1E+00
			Dermal Absorption[1]	Aluminum	1.7E+04	mg/kg	N/A		N/A		N/A	6.1E-04	mg/kg-day	1.0E+00	mg/kg/day	6.1E-04
				Arsenic	6.8E+00	mg/kg	N/A		N/A		N/A	7.3E-06	mg/kg-day	3.0E-04	mg/kg/day	2.4E-02
				Chromium	2.8E+01	mg/kg	N/A		N/A		N/A	1.0E-06	mg/kg-day	7.5E-05	mg/kg/day	1.3E-02
				Iron	1.8E+04	mg/kg	N/A		N/A		N/A	6.6E-04	mg/kg-day	7.0E-01	mg/kg/day	9.4E-04
				Vanadium	4.1E+01	mg/kg	N/A		N/A		N/A	1.5E-06	mg/kg-day	5.0E-03	mg/kg/day	2.9E-04
			Exp. Route Total								N/A					3.9E-02
		Exposure Point Total									N/A					1.1E+00
	Exposure Medium Total										N/A					1.1E+00
	Air	Emissions from Soil*	Inhalation	Chromium	2.1E-05	µg/m^3	N/A		N/A		N/A	2.0E-08	mg/m^3	1.0E-04	mg/m^3	2.0E-04
			Exp. Route Total								N/A					2.0E-04
		Exposure Point Total									N/A					2.0E-04
	Exposure Medium Total										N/A					2.0E-04
Soil* Total											N/A					1.1E+00
Groundwater	Groundwater	Tap Water	Ingestion	1,1,2,2-Tetrachloroethane	7.9E+01	µg/L	N/A		N/A		N/A	5.0E-03	mg/kg-day	2.0E-02	mg/kg/day	2.5E-01
				1,1,2-Trichloroethane	2.5E+00	µg/L	N/A		N/A		N/A	1.6E-04	mg/kg-day	4.0E-03	mg/kg/day	4.0E-02
				1,2-Dichloroethane	5.3E-01	µg/L	N/A		N/A		N/A	3.4E-05	mg/kg-day	6.0E-03	mg/kg/day	5.7E-03
				Benzene	1.3E+00	µg/L	N/A		N/A		N/A	8.1E-05	mg/kg-day	4.0E-03	mg/kg/day	2.0E-02
				Chloroform	3.9E-01	µg/L	N/A		N/A		N/A	2.5E-05	mg/kg-day	1.0E-02	mg/kg/day	2.5E-03
				cis-1,2-Dichloroethene	1.2E+02	µg/L	N/A		N/A		N/A	7.4E-03	mg/kg-day	2.0E-03	mg/kg/day	3.7E+00
				Tetrachloroethene	9.2E-01	µg/L	N/A		N/A		N/A	5.9E-05	mg/kg-day	1.0E-02	mg/kg/day	5.9E-03
				trans-1,2-Dichloroethene	5.2E+01	µg/L	N/A		N/A		N/A	3.3E-03	mg/kg-day	2.0E-02	mg/kg/day	1.7E-01
				Trichloroethene	1.1E+02	µg/L	N/A		N/A		N/A	7.1E-03	mg/kg-day	N/A	N/A	N/A
				Vinyl chloride	1.0E+01	µg/L	N/A		N/A		N/A	6.6E-04	mg/kg-day	3.0E-03	mg/kg/day	2.2E-01
			Exp. Route Total								N/A					4.4E+00
			Dermal Absorption[2]	1,1,2,2-Tetrachloroethane	7.9E+01	µg/L	N/A		N/A		N/A	6.1E-04	mg/kg-day	2.0E-02	mg/kg/day	3.1E-02
				1,1,2-Trichloroethane	2.5E+00	µg/L	N/A		N/A		N/A	1.5E-05	mg/kg-day	4.0E-03	mg/kg/day	3.6E-03
				1,2-Dichloroethane	5.3E-01	µg/L	N/A		N/A		N/A	1.7E-06	mg/kg-day	6.0E-03	mg/kg/day	2.8E-04
				Benzene	1.3E+00	µg/L	N/A		N/A		N/A	1.2E-05	mg/kg-day	4.0E-03	mg/kg/day	3.1E-03

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TABLE 7.2.RME

Calculation of Chemical Cancer Risks and Non-Cancer Hazards

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
				Chloroform	3.9E-01	µg/L	N/A		N/A		N/A	2.2E-06	mg/kg-day	1.0E-02	mg/kg/day	2.2E-04
				cis-1,2-Dichloroethene	1.2E+02	µg/L	N/A		N/A		N/A	6.6E-04	mg/kg-day	2.0E-03	mg/kg/day	3.3E-01
				Tetrachloroethene	9.2E-01	µg/L	N/A		N/A		N/A	3.4E-05	mg/kg-day	1.0E-02	mg/kg/day	3.4E-03
				trans-1,2-Dichloroethene	5.2E+01	µg/L	N/A		N/A		N/A	2.9E-04	mg/kg-day	2.0E-02	mg/kg/day	1.5E-02
				Trichloroethene	1.1E+02	µg/L	N/A		N/A		N/A	1.1E-03	mg/kg-day	N/A	N/A	N/A
				Vinyl chloride	1.0E+01	µg/L	N/A		N/A		N/A	3.6E-05	mg/kg-day	3.0E-03	mg/kg/day	1.2E-02
			Exp. Route Total								N/A					4.0E-01
		Exposure Point Total									N/A					4.8E+00
	Exposure Medium Total										N/A					4.8E+00
	Air	Water Vapors at Showerhead	Inhalation[3]	1,1,2,2-Tetrachloroethane	7.9E+01	µg/L	N/A		N/A		N/A	5.7E-03	mg/m^3	N/A		N/A
				1,1,2-Trichloroethane	2.5E+00	µg/L	N/A		N/A		N/A	2.6E-04	mg/m^3	2.0E-04	mg/m^3	1.3E+00
				1,2-Dichloroethane	5.3E-01	µg/L	N/A		N/A		N/A	6.7E-05	mg/m^3	7.0E-03	mg/m^3	9.6E-03
				Benzene	1.3E+00	µg/L	N/A		N/A		N/A	2.1E-04	mg/m^3	3.0E-02	mg/m^3	6.9E-03
				Chloroform	3.9E-01	µg/L	N/A		N/A		N/A	5.1E-05	mg/m^3	9.8E-02	mg/m^3	5.2E-04
				cis-1,2-Dichloroethene	1.2E+02	µg/L	N/A		N/A		N/A	1.7E-02	mg/m^3	N/A		N/A
				Tetrachloroethene	9.2E-01	µg/L	N/A		N/A		N/A	1.1E-04	mg/m^3	2.7E-01	mg/m^3	4.0E-04
				trans-1,2-Dichloroethene	5.2E+01	µg/L	N/A		N/A		N/A	7.5E-03	mg/m^3	6.0E-02	mg/m^3	1.3E-01
				Trichloroethene	1.1E+02	µg/L	N/A		N/A		N/A	1.4E-02	mg/m^3	1.0E-02	mg/m^3	1.4E+00
				Vinyl chloride	1.0E+01	µg/L	N/A		N/A		N/A	1.9E-03	mg/m^3	1.0E-01	mg/m^3	1.9E-02
			Exp. Route Total								N/A					2.9E+00
		Exposure Point Total									N/A					2.9E+00
	Exposure Medium Total										N/A					2.9E+00
Groundwater Total											N/A					7.7E+00
							Total of Receptor Risks Across All Media				N/A	Total of Receptor Hazards Across All Media				8.8E+00

Notes:

* Soil = combined surface and subsurface soil.

1. Dermal absorption factors (DABs) used to calculated dermal absorption intake from soil are chemical specific. DABS of 0.03 used for arsenic, and 0.001 for rest of metals.

2. Dermal absorption from groundwater calculated on Table 7.2.RME Supplement A.

3. Inhalation exposure while bathing calculated on Table 7.2.RME Supplement B

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TABLE 7.2.RME Supplement A

Calculation of Chemical Cancer Risks and Non-Cancer Hazards

Site 49

MCIEAST-MCB CAMLEJ
North Carolina

Chemical of Potential Concern	Water Concentration (CW) (µg/L)	Permeability Coefficient (Kp) (cm/hr)	B (dimensionless)	Lag Time (τ_{event}) (hr)	t* (hr)	Fraction Absorbed Water (FA) (dimensionless)	Duration of Event (tevent) (hr)	DAevent (mg/cm^2-event)	Eq
1,1,2,2-Tetrachloroethane	7.9E+01	6.9E-03	3.5E-02	9.3E-01	2.2E+00	1.0E+00	1	1.5E-06	2
1,1,2-Trichloroethane	2.5E+00	6.4E-03	2.9E-02	6.0E-01	1.4E+00	1.0E+00	1	3.5E-08	2
1,2-Dichloroethane	5.3E-01	4.2E-03	1.6E-02	3.8E-01	9.2E-01	1.0E+00	1	3.9E-09	3
Benzene	1.3E+00	1.5E-02	5.1E-02	2.9E-01	7.0E-01	1.0E+00	1	2.9E-08	3
Chloroform	3.9E-01	6.8E-03	2.9E-02	5.0E-01	1.2E+00	1.0E+00	1	5.2E-09	2
cis-1,2-Dichloroethene[1]	1.2E+02	7.7E-03	2.9E-02	3.7E-01	8.9E-01	1.0E+00	1	1.6E-06	3
Tetrachloroethene	9.2E-01	3.3E-02	1.7E-01	9.1E-01	2.2E+00	1.0E+00	1	8.1E-08	2
trans-1,2-Dichloroethene	5.2E+01	7.7E-03	2.9E-02	3.7E-01	8.9E-01	1.0E+00	1	7.0E-07	3
Trichloroethene	1.1E+02	1.2E-02	5.1E-02	5.8E-01	1.4E+00	1.0E+00	1	2.7E-06	2
Vinyl chloride	1.0E+01	5.6E-03	1.7E-02	2.4E-01	5.7E-01	1.0E+00	1	8.5E-08	3

Inorganics: DA_{event} (mg/cm^2-event) =
K_p x CW x t_{event} x 0.001 mg/µg x 0.001 l/cm^3 (eq 1)

Organics: DA_{event} (mg/cm^2-event) =
If $t_{event}<t^*$, then DA_{event} =
2 x FA x K_p x CW x (sqrt((6 x τ_{event} x t_{event})/π)) x 0.001 mg/µg x 0.001 l/cm^3 (eq 2)

If $t_{event}>t^*$, then DA_{event} =
FA x K_p x CW x (t_{event}/(1+B) + 2 x τ_{event} x ((1 + 3xB + 3xB^2)/(1+B)^2) x 0.001 mg/µg x 0.001 l/cm^3 (eq 3)

Notes:
[1] trans-1,2-Dichloroethene values used as surrogate.
Parameter values from EPA 2004, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment - Final).* EPA/540/R/99/005.
B - Dimensionless ratio of the permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis (dimensionless).
t* - Time to reach steady-state

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TABLE 7.2.RME Supplement B

Calculation of Chemical Cancer Risks and Non-Cancer Hazards

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Chemical of Potential Concern	Exposure Point Concentration Cwo (µg/L)	Molecular weight (MW) (g/mole)	Henry's Law Constant (H) (atm-m^3/mole)	Kg (VOC) (cm/hr)	Kl (VOC) (cm/hr)	KL (cm/hr)	Kal (cm/hr)	Cwd (µg/L)	S (µg/m^3 -min)	Ca (mg/m^3)
1,1,2,2-Tetrachloroethane	7.9E+01	1.7E+02	3.7E-04	9.8E+02	1.0E+01	6.1E+00	8.2E+00	5.2E+00	4.3E+00	1.2E-01
1,1,2-Trichloroethane	2.5E+00	1.3E+02	8.2E-04	1.1E+03	1.1E+01	8.8E+00	1.2E+01	2.4E-01	2.0E-01	5.6E-03
1,2-Dichloroethane	5.3E-01	9.9E+01	1.2E-03	1.3E+03	1.3E+01	1.1E+01	1.5E+01	6.2E-02	5.2E-02	1.5E-03
Benzene	1.3E+00	7.8E+01	5.6E-03	1.4E+03	1.5E+01	1.4E+01	1.9E+01	1.9E-01	1.6E-01	4.5E-03
Chloroform	3.9E-01	1.2E+02	3.7E-03	1.2E+03	1.2E+01	1.1E+01	1.5E+01	4.7E-02	3.9E-02	1.1E-03
cis-1,2-Dichloroethene	1.2E+02	9.7E+01	4.1E-03	1.3E+03	1.3E+01	1.3E+01	1.7E+01	1.5E+01	1.3E+01	3.7E-01
Tetrachloroethene	9.2E-01	1.7E+02	1.8E-02	9.9E+02	1.0E+01	1.0E+01	1.4E+01	1.0E-01	8.3E-02	2.4E-03
trans-1,2-Dichloroethene	5.2E+01	9.7E+01	4.1E-03	1.3E+03	1.3E+01	1.3E+01	1.7E+01	6.9E+00	5.8E+00	1.6E-01
Trichloroethene	1.1E+02	1.3E+02	9.9E-03	1.1E+03	1.2E+01	1.1E+01	1.5E+01	1.3E+01	1.1E+01	3.1E-01
Vinyl chloride	1.0E+01	6.3E+01	2.8E-02	1.6E+03	1.7E+01	1.7E+01	2.2E+01	1.8E+00	1.5E+00	4.2E-02

Variables	Units	Exposure Assumptions
Kg(VOC) = gas-film mass transfer coefficient	cm/hr	Solved by Eq 1
Kl(VOC) = liquid-film mass transfer coefficient	cm/hr	Solved by Eq 2
KL = overall mass transfer coefficient	cm/hr	Solved by Eq 3
Kal = adjusted overall mass transfer coeff.	cm/hr	Solved by Eq 4
Tl = Calibration temp. of water	K (20C +273)	293
Ts = Shower water temperature	k (45C)	318
Us = water viscosity at Ts	centipoise	0.596
Ul = water viscosity at Tl	cp	1.002
Cwd = conc. leaving droplets after time sdt	µg/l	Solved by Eq 5
sdt = shower droplet drop time	sec	0.5
d = shower droplet diameter	mm	1
FR = shower water flow rate	l/min	10
SV = shower room air volume	m^3	12
S = indoor VOC generation rate	µg/m^3-min	Solved by Eq 6
Ds = duration of shower	min	60
Dt = total duration in shower room	min	70
R = air exchange rate	min^{-1}	0.0083
Ca = indoor air concentration of VOCs	µg/m^3	Solved by Eq 7

Equation 1:	Kg(VOC) =	$3000 * (18 / MW)^{0.5}$
Equation 2:	Kl(VOC) =	$20 * (44 / MW)^{0.5}$
Equation 3:	KL =	$((1 / Kl(VOC)) + (0.024 / (Kg (VOC) * H)))^{-1}$
Equation 4:	Kal =	$(KL * (((Tl * Us) / (Ts * Ul))^{-0.5}))$
Equation 5:	Cwd =	(Cwo * (1-EXP((-1 * Kal * sdt)/(60 * d))))
Equation 6:	S =	(Cwd * FR / SV)
Equation 7:	Ca =	If t>Ds [(S / R) * (Ds + (EXP(-R * Dt) / R) -(EXP(R *(Ds - Dt)) / R)] / Dt * 1/1000

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TABLE 7.3.RME

Calculation of Chemical Cancer Risks and Non-Cancer Hazards

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Soil*	Soil*	Ingestion	Aluminum	1.7E+04	mg/kg	2.7E-02	mg/kg-day	N/A		N/A	N/A		N/A		N/A
				Arsenic	6.8E+00	mg/kg	1.1E-05	mg/kg-day	1.5E+00	mg/kg-day	1.6E-05	N/A		N/A		N/A
				Chromium[4]	2.8E+01	mg/kg			5.0E-01	mg/kg-day	9.3E-05	N/A		N/A		N/A
				Iron	1.8E+04	mg/kg	2.9E-02	mg/kg-day	N/A		N/A	N/A		N/A		N/A
				Vanadium	4.1E+01	mg/kg	6.4E-05	mg/kg-day	N/A		N/A	N/A		N/A		N/A
			Exp. Route Total								1.1E-04					N/A
			Dermal Absorption[1]	Aluminum	1.7E+04	mg/kg	8.4E-05	mg/kg-day	N/A		N/A	N/A		N/A		N/A
				Arsenic	6.8E+00	mg/kg	1.0E-06	mg/kg-day	1.5E+00	mg/kg-day	1.5E-06	N/A		N/A		N/A
				Chromium[4]	2.8E+01	mg/kg			2.0E+01	mg/kg-day	1.1E-05	N/A		N/A		N/A
				Iron	1.8E+04	mg/kg	9.1E-05	mg/kg-day	N/A		N/A	N/A		N/A		N/A
				Vanadium	4.1E+01	mg/kg	2.0E-07	mg/kg-day	N/A		N/A	N/A		N/A		N/A
			Exp. Route Total								1.3E-05					N/A
		Exposure Point Total									1.2E-04					N/A
	Exposure Medium Total										1.2E-04					N/A
	Air	Emissions from Soil*	Inhalation	Chromium[4]	2.1E-05	µg/m³			8.4E-02	(µg/m3)-1	1.8E-06	N/A		N/A		N/A
			Exp. Route Total								1.8E-06					N/A
		Exposure Point Total									1.8E-06					N/A
	Exposure Medium Total										1.8E-06					N/A
Soil* Total											1.2E-04					N/A
Groundwater	Groundwater	Tap Water	Ingestion	1,1,2,2-Tetrachloroethane	7.9E+01	µg/L	1.2E-03	mg/kg-day	2.0E-01	mg/kg-day	2.3E-04	N/A		N/A		N/A
				1,1,2-Trichloroethane	2.5E+00	µg/L	3.8E-05	mg/kg-day	5.7E-02	mg/kg-day	2.1E-06	N/A		N/A		N/A
				1,2-Dichloroethane	5.3E-01	µg/L	7.9E-06	mg/kg-day	9.1E-02	mg/kg-day	7.2E-07	N/A		N/A		N/A
				Benzene	1.3E+00	µg/L	1.9E-05	mg/kg-day	5.5E-02	mg/kg-day	1.0E-06	N/A		N/A		N/A
				Chloroform	3.9E-01	µg/L	5.8E-06	mg/kg-day	3.1E-02	mg/kg-day	1.8E-07	N/A		N/A		N/A
				cis-1,2-Dichloroethene	1.2E+02	µg/L	1.7E-03	mg/kg-day	N/A		N/A	N/A		N/A		N/A
				Tetrachloroethene	9.2E-01	µg/L	1.4E-05	mg/kg-day	5.4E-01	mg/kg-day	7.4E-06	N/A		N/A		N/A
				trans-1,2-Dichloroethene	5.2E+01	µg/L	7.8E-04	mg/kg-day	N/A		N/A	N/A		N/A		N/A
				Trichloroethene	1.1E+02	µg/L	1.7E-03	mg/kg-day	5.9E-03	mg/kg-day	9.8E-06	N/A		N/A		N/A
				Vinyl chloride[4]	1.0E+01	µg/L			7.2E-01	mg/kg-day	1.6E-04	N/A		N/A		N/A
			Exp. Route Total								4.1E-04					N/A
			Dermal Absorption[2]	1,1,2,2-Tetrachloroethane	7.9E+01	µg/L	1.5E-04	mg/kg-day	2.0E-01	mg/kg-day	2.9E-05	N/A		N/A		N/A
				1,1,2-Trichloroethane	2.5E+00	µg/L	3.5E-06	mg/kg-day	5.7E-02	mg/kg-day	2.0E-07	N/A		N/A		N/A
				1,2-Dichloroethane	5.3E-01	µg/L	3.9E-07	mg/kg-day	9.1E-02	mg/kg-day	3.5E-08	N/A		N/A		N/A
				Benzene	1.3E+00	µg/L	2.9E-06	mg/kg-day	5.5E-02	mg/kg-day	1.6E-07	N/A		N/A		N/A

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TABLE 7.3.RME

Calculation of Chemical Cancer Risks and Non-Cancer Hazards

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
				Chloroform	3.9E-01	µg/L	5.2E-07	mg/kg-day	3.1E-02	mg/kg-day	1.6E-08	N/A		N/A		N/A
				cis-1,2-Dichloroethene	1.2E+02	µg/L	1.5E-04	mg/kg-day	N/A		N/A	N/A		N/A		N/A
				Tetrachloroethene	9.2E-01	µg/L	8.2E-06	mg/kg-day	5.4E-01	mg/kg-day	4.4E-06	N/A		N/A		N/A
				trans-1,2-Dichloroethene	5.2E+01	µg/L	6.9E-05	mg/kg-day	N/A		N/A	N/A		N/A		N/A
				Trichloroethene	1.1E+02	µg/L	2.7E-04	mg/kg-day	5.9E-03	mg/kg-day	1.6E-06	N/A		N/A		N/A
				Vinyl chloride[4]	1.0E+01	µg/L			7.2E-01	mg/kg-day	8.3E-06	N/A		N/A		N/A
			Exp. Route Total								4.4E-05					N/A
		Exposure Point Total									4.5E-04					N/A
	Exposure Medium Total										4.5E-04					N/A
	Air	Water Vapors at Showerhead	Inhalation[3]	1,1,2,2-Tetrachloroethane	7.9E+01	µg/L	1.7E+00	$\mu g/m^3$	5.8E-05	$(\mu g/m^3)^{-1}$	9.9E-05	N/A		N/A		N/A
				1,1,2-Trichloroethane	2.5E+00	µg/L	7.8E-02	$\mu g/m^3$	1.6E-05	$(\mu g/m^3)^{-1}$	1.2E-06	N/A		N/A		N/A
				1,2-Dichloroethane	5.3E-01	µg/L	2.0E-02	$\mu g/m^3$	2.6E-05	$(\mu g/m^3)^{-1}$	5.3E-07	N/A		N/A		N/A
				Benzene	1.3E+00	µg/L	6.2E-02	$\mu g/m^3$	7.8E-06	$(\mu g/m^3)^{-1}$	4.8E-07	N/A		N/A		N/A
				Chloroform	3.9E-01	µg/L	1.5E-02	$\mu g/m^3$	2.3E-05	$(\mu g/m^3)^{-1}$	3.5E-07	N/A		N/A		N/A
				cis-1,2-Dichloroethene	1.2E+02	µg/L	5.1E+00	$\mu g/m^3$	N/A		N/A	N/A		N/A		N/A
				Tetrachloroethene	9.2E-01	µg/L	3.3E-02	$\mu g/m^3$	5.9E-06	$(\mu g/m^3)^{-1}$	1.9E-07	N/A		N/A		N/A
				trans-1,2-Dichloroethene	5.2E+01	µg/L	2.3E+00	$\mu g/m^3$	N/A		N/A	N/A		N/A		N/A
				Trichloroethene	1.1E+02	µg/L	4.3E+00	$\mu g/m^3$	2.0E-06	$(\mu g/m^3)^{-1}$	8.7E-06	N/A		N/A		N/A
				Vinyl chloride	1.0E+01	µg/L			4.4E-06	$(\mu g/m^3)^{-1}$	3.3E-06	N/A		N/A		N/A
			Exp. Route Total								1.1E-04					N/A
		Exposure Point Total									1.1E-04					N/A
	Exposure Medium Total										1.1E-04					N/A
Groundwater Total											5.7E-04					N/A
							Total of Receptor Risks Across All Media				6.9E-04	Total of Receptor Hazards Across All Media				N/A

Notes:

* Soil = combined surface and subsurface soil.

1. Dermal absorption factors (DABs) used to calculated dermal absorption intake from soil are chemical specific. DABS of 0.03 used for arsenic, and 0.001 for rest of metals.

2. Dermal absorption from groundwater calculated on Tables 7,1,RME and 7.2.RME Supplement A.

3. Inhalation exposure while bathing calculated on Tables 7.1.RME and 7.2.RME Supplement B

4. See Table 7.3.RME Supplement A for calculation of intake and cancer risk following MMOA method.

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TABLE 7.3.RME Supplement A

Calculation of Chemical Cancer Risks For COPCs with Mutagenic Mode of Action

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe:	Future
Receptor Population:	Resident
Receptor Age:	Adult/Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations										
							Intake					CSF/Unit Risk					
					Value	Units	Value				Units	Value				Units	Cancer Risk
							0-2 yrs	2-6 yrs	6-16 years	16-30 yrs		0-2 yrs (ADAF=10)	2-6 yrs (ADAF=3)	6-16 yrs (ADAF=3)	16-30 yrs (ADAF=1)		
Soil*	Soil*	Soil*	Ingestion	Chromium	2.8E+01	mg/kg	1.0E-05	2.0E-05	5.4E-06	7.6E-06	mg/kg/day	5.0E+00	1.5E+00	1.5E+00	5.0E-01	1/(mg/kg-day)	9.3E-05
			Dermal	Chromium	2.8E+01	mg/kg	2.8E-08	5.7E-08	2.2E-08	3.0E-08	mg/kg/day	2.0E+02	6.0E+01	6.0E+01	2.0E+01	1/(mg/kg-day)	1.1E-05
	Air	Emissions from Soil*	Inhalation	Chromium	2.1E-05	μg/m^3	5.8E-07	1.2E-06	2.9E-06	4.0E-06	ug/m^3	8.4E-01	2.5E-01	2.5E-01	8.4E-02	(μg/m^3)$^{-1}$	1.8E-06
Groundwater	Groundwater	Tap Water	Ingestion	Vinyl chloride	1.0E+01	ug/l	5.7E-05		9.7E-05		mg/kg/day	1.5E+00		7.2E-01		1/(mg/kg-day)	1.6E-04
			Dermal	Vinyl chloride	1.0E+01	ug/l	3.1E-06		5.2E-06		mg/kg/day	1.5E+00		7.2E-01		1/(mg/kg-day)	8.3E-06
			Inhalation	Vinyl chloride	1.0E+01	ug/l	1.6E-01		4.2E-01		ug/m^3	8.8E-06		4.4E-06		(μg/m^3)$^{-1}$	3.3E-06

Notes:

chromium - Cancer risk = (Intake$_{0\text{-}2}$ x CSF$_{0\text{-}2}$) + (Intake$_{2\text{-}6}$ x CSF$_{2\text{-}6}$) + (Intake$_{6\text{-}16}$ x CSF$_{6\text{-}16}$) + (Intake$_{16\text{-}30}$ x CSF$_{16\text{-}30}$)

vinyl chloride - Cancer risk =(Intake$_{0\text{-}6}$ x CSF$_{0\text{-}6}$) + (Intake$_{6\text{-}30}$ x CSF$_{6\text{-}30}$)

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TABLE 7.4.RME

Calculation of Chemical Cancer Risks and Non-Cancer Hazards

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Soil*	Soil*	Ingestion	Aluminum	1.7E+04	mg/kg	7.8E-04	mg/kg-day	N/A		N/A	5.5E-02	mg/kg-day	1.0E+00	mg/kg-day	5.5E-02
				Arsenic	6.8E+00	mg/kg	3.1E-07	mg/kg-day	1.5E+00	mg/kg-day	4.7E-07	2.2E-05	mg/kg-day	3.0E-04	mg/kg-day	7.3E-02
				Chromium	2.8E+01	mg/kg	1.3E-06	mg/kg-day	5.0E-01	mg/kg-day	6.4E-07	9.0E-05	mg/kg-day	2.0E-02	mg/kg-day	4.5E-03
				Iron	1.8E+04	mg/kg	8.5E-04	mg/kg-day	N/A		N/A	5.9E-02	mg/kg-day	7.0E-01	mg/kg-day	8.5E-02
				Vanadium	4.1E+01	mg/kg	1.9E-06	mg/kg-day	N/A		N/A	1.3E-04	mg/kg-day	7.0E-03	mg/kg-day	1.9E-02
			Exp. Route Total								1.1E-06					2.4E-01
			Dermal	Aluminum	1.7E+04	mg/kg	1.6E-06	mg/kg-day	N/A	N/A	N/A	1.1E-04	mg/kg-day	1.0E+00	mg/kg-day	1.1E-04
				Arsenic	6.8E+00	mg/kg	1.9E-08	mg/kg-day	1.5E+00	mg/kg-day	2.8E-08	1.3E-06	mg/kg-day	3.0E-04	mg/kg-day	4.4E-03
				Chromium	2.8E+01	mg/kg	2.6E-09	mg/kg-day	2.0E+01	mg/kg-day	5.1E-08	1.8E-07	mg/kg-day	5.0E-04	mg/kg-day	3.6E-04
				Iron	1.8E+04	mg/kg	1.7E-06	mg/kg-day	N/A	N/A	N/A	1.2E-04	mg/kg-day	7.0E-01	mg/kg-day	1.7E-04
				Vanadium	4.1E+01	mg/kg	3.7E-09	mg/kg-day	N/A	N/A	N/A	2.6E-07	mg/kg-day	7.0E-03	mg/kg-day	3.7E-05
			Exp. Route Total								8.0E-08					5.1E-03
		Exposure Point Total									1.2E-06					2.4E-01
	Exposure Medium Total										1.2E-06					2.4E-01
	Air	Emissions from Soil*	Inhalation	Chromium (hexavalent)	2.1E-05	µg/m^3	6.9E-08	µg/m^3	8.4E-02	(µg/m^3)$^{-1}$	5.8E-09	4.8E-09	mg/m^3	1.0E-04	mg/m^3	4.8E-05
			Exp. Route Total								5.8E-09					4.8E-05
		Exposure Point Total									5.8E-09					4.8E-05
	Exposure Medium Total										5.8E-09					4.8E-05
Soil* Total											1.2E-06					2.4E-01

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TABLE 7.4.RME

Calculation of Chemical Cancer Risks and Non-Cancer Hazards

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater	Groundwater	Water in Excavation Pit	Dermal	1,1,2,2-Tetrachloroethan	7.9E+01	µg/L	1.3E-06	mg/kg-day	2.0E-01	mg/kg-day	2.5E-07	8.8E-05	mg/kg-day	2.0E-02	mg/kg-day	4.4E-03
				1,1,2-Trichloroethane	2.5E+00	µg/L	3.3E-08	mg/kg-day	5.7E-02	mg/kg-day	1.9E-09	2.3E-06	mg/kg-day	4.0E-03	mg/kg-day	5.8E-04
				1,2-Dichloroethane	5.3E-01	µg/L	4.2E-09	mg/kg-day	9.1E-02	mg/kg-day	3.8E-10	2.9E-07	mg/kg-day	2.0E-02	mg/kg-day	1.5E-05
				Benzene	1.3E+00	µg/L	3.3E-08	mg/kg-day	5.5E-02	mg/kg-day	1.8E-09	2.3E-06	mg/kg-day	1.0E-02	mg/kg-day	2.3E-04
				Chloroform	3.9E-01	µg/L	5.2E-09	mg/kg-day	3.1E-02	mg/kg-day	1.6E-10	3.6E-07	mg/kg-day	1.0E-02	mg/kg-day	3.6E-05
				cis-1,2-Dichloroethene	1.2E+02	µg/L	1.7E-06	mg/kg-day	N/A		N/A	1.2E-04	mg/kg-day	2.0E-02	mg/kg-day	5.8E-03
				Tetrachloroethene	9.2E-01	µg/L	6.8E-08	mg/kg-day	5.4E-01	mg/kg-day	3.7E-08	4.8E-06	mg/kg-day	1.0E-01	mg/kg-day	4.8E-05
				trans-1,2-Dichloroethene	5.2E+01	µg/L	7.4E-07	mg/kg-day	N/A		N/A	5.2E-05	mg/kg-day	2.0E-01	mg/kg-day	2.6E-04
				Trichloroethene	1.1E+02	µg/L	2.6E-06	mg/kg-day	5.9E-03	mg/kg-day	1.5E-08	1.8E-04	mg/kg-day	N/A	N/A	N/A
				Vinyl chloride	1.0E+01	µg/L	1.0E-07	mg/kg-day	7.2E-01	mg/kg-day	7.3E-08	7.1E-06	mg/kg-day	3.0E-03	mg/kg-day	2.4E-03
			Exp. Route Total								3.8E-07					1.4E-02
		Exposure Point Total									3.8E-07					1.4E-02
	Exposure Medium Total										3.8E-07					1.4E-02
Groundwater	Air	Water Vapors at Excavation Pit	Inhalation	1,1,2,2-Tetrachloroethan	1.2E-04	mg/m^3	2.9E-06	$\mu g/m^3$	5.8E-05		1.7E-10	2.0E-07	mg/m^3	N/A		N/A
				1,1,2-Trichloroethane	4.7E-06	mg/m^3	1.1E-07	$\mu g/m^3$	1.6E-05	$(\mu g/m^3)^{-1}$	1.7E-12	7.7E-09	mg/m^3	2.0E-03	mg/m^3	3.8E-06
				1,2-Dichloroethane	1.2E-06	mg/m^3	2.8E-08	$\mu g/m^3$	2.6E-05	$(\mu g/m^3)^{-1}$	7.2E-13	1.9E-09	mg/m^3	7.0E-02	mg/m^3	2.8E-08
				Benzene	4.9E-06	mg/m^3	1.1E-07	$\mu g/m^3$	7.8E-06	$(\mu g/m^3)^{-1}$	8.9E-13	8.0E-09	mg/m^3	8.0E-02	mg/m^3	1.0E-07
				Chloroform	1.2E-06	mg/m^3	2.7E-08	$\mu g/m^3$	2.3E-05	$(\mu g/m^3)^{-1}$	6.3E-13	1.9E-09	mg/m^3	9.8E-02	mg/m^3	2.0E-08
				cis-1,2-Dichloroethene	4.0E-04	mg/m^3	9.3E-06	$\mu g/m^3$	N/A		N/A	6.5E-07	mg/m^3	N/A		N/A
				Tetrachloroethene	5.0E-06	mg/m^3	1.2E-07	$\mu g/m^3$	5.9E-06	$(\mu g/m^3)^{-1}$	6.9E-13	8.2E-09	mg/m^3	2.7E-01	mg/m^3	3.0E-08
				trans-1,2-Dichloroethene	1.8E-04	mg/m^3	4.1E-06	$\mu g/m^3$	N/A	$(\mu g/m^3)^{-1}$	N/A	2.9E-07	mg/m^3	6.2E-02	mg/m^3	4.6E-06
				Trichloroethene	5.1E-04	mg/m^3	1.2E-05	$\mu g/m^3$	2.0E-06	$(\mu g/m^3)^{-1}$	2.4E-11	8.4E-07	mg/m^3	1.0E-02	mg/m^3	8.4E-05
				Vinyl chloride	1.6E-04	mg/m^3	3.6E-06	$\mu g/m^3$	4.4E-06	$(\mu g/m^3)^{-1}$	1.6E-11	2.5E-07	mg/m^3	1.0E-01	mg/m^3	2.5E-06
			Exp. Route Total								2.1E-10					9.5E-05
		Exposure Point Total									2.1E-10					9.5E-05
	Exposure Medium Total										2.1E-10					9.5E-05
Groundwater Total											3.8E-07					1.4E-02
									Total of Receptor Risks Across All Media		1.6E-06	Total of Receptor Hazards Across All Media				2.6E-01

Notes:

* Soil = combined surface and subsurface soil.

N/A = Not available/not applicable

1. Dermal absorption factors (DABs) used to calculated dermal absorption intake from soil are chemical specific. DABS of 0.03 used for arsenic, and 0.001 for rest of metals.
2. Dermal absorption from groundwater calculated on Table 7.4.RME Supplement A.
3. Inhalation exposure calculated on Table 7.4.RME Supplement B.

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TABLE 7.4.RME Supplment A

Calculation of Daevent - Construction Groundwater

Site 49

MCIEAST-MCB CAMLEJ
North Carolina

Chemical of Potential Concern	Water Concentration (CW) (µg/L)	Permeability Coefficient (Kp) (cm/hr)	B (dimensionless)	Lag Time (τ_{event}) (hr)	t* (hr)	Fraction Absorbed Water (FA) (dimensionless)	Duration of Event (tevent) (hr)	DAevent (mg/cm²-event)	Eq
1,1,2,2-Tetrachloroethane	7.9E+01	6.9E-03	3.5E-02	9.3E-01	2.2E+00	1.0E+00	4	3.2E-06	3
1,1,2-Trichloroethane	2.5E+00	6.4E-03	2.9E-02	6.0E-01	1.4E+00	1.0E+00	4	8.3E-08	3
1,2-Dichloroethane	5.3E-01	4.2E-03	1.6E-02	3.8E-01	9.2E-01	1.0E+00	4	1.1E-08	3
Benzene	1.3E+00	1.5E-02	5.1E-02	2.9E-01	7.0E-01	1.0E+00	4	8.3E-08	3
Chloroform	3.9E-01	6.8E-03	2.9E-02	5.0E-01	1.2E+00	1.0E+00	4	1.3E-08	3
cis-1,2-Dichloroethene[1]	1.2E+02	7.7E-03	2.9E-02	3.7E-01	8.9E-01	1.0E+00	4	4.2E-06	3
Tetrachloroethene	9.2E-01	3.3E-02	1.7E-01	9.1E-01	2.2E+00	1.0E+00	4	1.7E-07	3
trans-1,2-Dichloroethene	5.2E+01	7.7E-03	2.9E-02	3.7E-01	8.9E-01	1.0E+00	4	1.9E-06	3
Trichloroethene	1.1E+02	1.2E-02	5.1E-02	5.8E-01	1.4E+00	1.0E+00	4	6.5E-06	3
Vinyl chloride	1.0E+01	5.6E-03	1.7E-02	2.4E-01	5.7E-01	1.0E+00	4	2.6E-07	3

Inorganics: DA_{event} (mg/cm^2-event) =
K_p x CW x t_{event} x 0.001 mg/µg x 0.001 l/cm^3 (eq 1)

Organics: DA_{event} (mg/cm^2-event) =
If t_{event}<t*, then DA_{event} =
2 x FA x K_p x CW x (sqrt((6 x τ_{event} x t_{event})/π)) x 0.001 mg/µg x 0.001 l/cm^3 (eq 2)

If t_{event}>t*, then DA_{event} =
FA x K_p x CW x (t_{event}/(1+B) + 2 x τ_{event} x ((1 + 3xB + 3xB^2)/(1+B)^2) x 0.001 mg/µg x 0.001 l/cm^3 (eq 3)

Notes:
[1] trans-1,2-Dichloroethene values used as surrogate.
Parameter values from EPA 2004, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment - Final).* EPA/540/R/99/005.
B - Dimensionless ratio of the permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis (dimensionless).
t* - Time to reach steady-state

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TABLE 7.4.RME Supplment B

Inhalation of Volatiles from Groundwater During Construction

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Chemical	Cw (µg/L)	Diffusivity in Air (cm^2/s)	Diffusivity in Water (cm^2/s)	K_H (unitless)	D^{eff}_{cap} (cm^2/s)	D^{eff} (cm^2/s)	DF_{amb} (cm/s)	$VF_{gw,amb}$ (L/m^3)	Ca (mg/m^3)
1,1,2,2-Tetrachloroethane	7.9E+01	4.89E-02	9.29E-06	1.50E-02	1.3E-04	1.3E-04	1.2E+01	1.6E-03	1.2E-04
1,1,2-Trichloroethane	2.5E+00	6.69E-02	1.00E-05	3.37E-02	6.6E-05	6.6E-05	1.2E+01	1.9E-03	4.7E-06
1,2-Dichloroethane	5.3E-01	8.57E-02	1.10E-05	4.82E-02	5.5E-05	5.5E-05	1.2E+01	2.2E-03	1.2E-06
Benzene	1.3E+00	8.95E-02	1.03E-05	2.27E-01	2.0E-05	2.0E-05	1.2E+01	3.9E-03	4.9E-06
Chloroform	3.9E-01	7.69E-02	1.09E-05	1.50E-01	2.4E-05	2.4E-05	1.2E+01	3.0E-03	1.2E-06
cis-1,2-Dichloroethene	1.2E+02	8.84E-02	1.13E-05	1.67E-01	2.5E-05	2.5E-05	1.2E+01	3.4E-03	4.0E-04
Tetrachloroethene	9.2E-01	5.05E-02	9.46E-06	7.24E-01	9.1E-06	9.1E-06	1.2E+01	5.5E-03	5.0E-06
trans-1,2-Dichloroethene	5.2E+01	8.76E-02	1.12E-05	1.67E-01	2.4E-05	2.4E-05	1.2E+01	3.4E-03	1.8E-04
Trichloroethene	1.1E+02	6.87E-02	1.02E-05	4.03E-01	1.4E-05	1.4E-05	1.2E+01	4.6E-03	5.1E-04
Vinyl chloride	1.0E+01	1.07E-01	1.20E-05	1.14E+00	1.6E-05	1.6E-05	1.2E+01	1.5E-02	1.6E-04

Equations

Equation 1 $VF_{gw,amb} = 1/((DF_{amb} * L_{GW} / D_{eff}) * (1/K_H)) * 10^3\ L/m^3$

Equation 2 $DF_{amb} = (U_{air} * W * d_{air})/A$

Equation 3 $D^{eff} = L_{gw}/((h_v/D^{eff}_s) + (h_{cap}/D^{eff}_{cap}))$

Equation 4 $D^{eff}_{cap} = (D^{air} * \Theta^{3.33}_{acap}/\Theta^2_T) + (D^{wat} * 1/K_H * \Theta^{3.33}_{wcap}/\Theta^2_T)$

Equation 5 Ca = Cw x VF /1000

Variables	Units	Exposure Assumptions	Source
$VF_{gw,amb}$ = volatilzation factor for groundwater	(L/m^3)	Solved by Eq 1	
K_H - Henry's Law Constant	(unitless)	chem-specific	
L_{GW} = depth to groundwater, $h_v + h_{cap}$	(cm)	0.1	
h_v = thickness of vadose zone	(cm)	0	default
h_{cap} = thickness of capillary fringe	(cm)	0.1	default
D^{eff} = effective diffusion coefficient between groundwater and surface soil	(cm^2/s)	Solved by Eq 3	
DF_{amb} = dispersion factor for outdoor air	(cm/s)	Solved by Eq 2	
U_{air} = wind speed above ground surface in mixing zone	(cm/s)	340	site-specific
d_{air} = ambiend air mixing zone	(cm)	200	default
W = width of source parallel to groundwater flow direction	(cm)	4,500	default
A = source-zone area	(cm^2)	25,548,336	site-specific
D^{eff}_{cap} = effecitve diffusion through capillary fringe	(cm^2/s)	Solved by Eq 4	
D^{eff}_s = effecitve diffusion in soil based on vapor-phase concentration	(cm^2/s)	chem-specific	
D^{air} = diffusion coefficent in air	(cm^2/s)	chem-specific	
D^{wat} = diffusion coefficent in water	(cm^2/s)	chem-specific	
Θ_{acap} = volumetric air content in capillary fringe soils	(cm^3-air/cm^3-soil)	0.038	default
Θ_{wcap} = volumetric water content in capillary fringe soils	(cm^3-H_2O/cm^3-soil)	0.342	default
Θ_T = total soil porosity	(cm^3-H_2O/cm^3-soil)	0.38	default
Cw = groundwater concentration	(mg/L)	chem-specific	

Appendix F

TABLE 7.5.RME

Calculation of Chemical Cancer Risks and Non-Cancer Hazards

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Soil*	Soil*	Ingestion	Aluminum	1.7E+04	mg/kg	5.9E-03	mg/kg-day	N/A		N/A	1.7E-02	mg/kg-day	1.0E+00	mg/kg-day	1.7E-02
				Arsenic	6.8E+00	mg/kg	2.4E-06	mg/kg-day	1.5E+00	mg/kg-day	3.6E-06	6.7E-06	mg/kg-day	3.0E-04	mg/kg-day	2.2E-02
				Chromium	2.8E+01	mg/kg	9.7E-06	mg/kg-day	5.0E-01	mg/kg-day	4.9E-06	2.7E-05	mg/kg-day	3.0E-03	mg/kg-day	9.1E-03
				Iron	1.8E+04	mg/kg	6.4E-03	mg/kg-day	N/A		N/A	1.8E-02	mg/kg-day	7.0E-01	mg/kg-day	2.6E-02
				Vanadium	4.1E+01	mg/kg	1.4E-05	mg/kg-day	N/A		N/A	4.0E-05	mg/kg-day	5.0E-03	mg/kg-day	7.9E-03
			Exp. Route Total								8.4E-06					8.2E-02
			Dermal Absorption[1]	Aluminum	1.7E+04	mg/kg	3.9E-05	mg/kg-day	N/A	mg/kg-day	N/A	1.1E-04	mg/kg-day	1.0E+00	mg/kg-day	1.1E-04
				Arsenic	6.8E+00	mg/kg	4.7E-07	mg/kg-day	1.5E+00	mg/kg-day	7.1E-07	1.3E-06	mg/kg-day	3.0E-04	mg/kg-day	4.4E-03
				Chromium	2.8E+01	mg/kg	6.4E-08	mg/kg-day	2.0E+01	mg/kg-day	1.3E-06	1.8E-07	mg/kg-day	7.5E-05	mg/kg-day	2.4E-03
				Iron	1.8E+04	mg/kg	4.2E-05	mg/kg-day	N/A	mg/kg-day	N/A	1.2E-04	mg/kg-day	7.0E-01	mg/kg-day	1.7E-04
				Vanadium	4.1E+01	mg/kg	9.4E-08	mg/kg-day	N/A	mg/kg-day	N/A	2.6E-07	mg/kg-day	5.0E-03	mg/kg-day	5.2E-05
			Exp. Route Total								2.0E-06					7.1E-03
		Exposure Point Total									1.0E-05					8.9E-02
	Exposure Medium Total										1.0E-05					8.9E-02
	Air	Emissions from Soil*	Inhalation	Chromium	2.1E-05	$\mu g/m^3$	1.7E-06	$\mu g/m^3$	8.4E-02	$(\mu g/m^3)^{-1}$	1.4E-07	4.8E-09	mg/m^3	1.0E-04	mg/m^3	4.8E-05
			Exp. Route Total								1.4E-07					4.8E-05
		Exposure Point Total									1.4E-07					4.8E-05
	Exposure Medium Total										1.4E-07					4.8E-05
Soil* Total											1.1E-05					8.9E-02
Groundwater	Groundwater	Tap Water	Ingestion	1,1,2,2-Tetrachloroethane	7.9E+01	µg/L	2.7E-04	mg/kg-day	2.0E-01	mg/kg-day	5.5E-05	7.7E-04	mg/kg-day	2.0E-02	mg/kg-day	3.8E-02
				1,1,2-Trichloroethane	2.5E+00	µg/L	8.8E-06	mg/kg-day	5.7E-02	mg/kg-day	5.0E-07	2.5E-05	mg/kg-day	4.0E-03	mg/kg-day	6.1E-03
				1,2-Dichloroethane	5.3E-01	µg/L	1.9E-06	mg/kg-day	9.1E-02	mg/kg-day	1.7E-07	5.2E-06	mg/kg-day	6.0E-03	mg/kg-day	8.7E-04
				Benzene	1.3E+00	µg/L	4.4E-06	mg/kg-day	5.5E-02	mg/kg-day	2.4E-07	1.2E-05	mg/kg-day	4.0E-03	mg/kg-day	3.1E-03
				Chloroform	3.9E-01	µg/L	1.4E-06	mg/kg-day	3.1E-02	mg/kg-day	4.2E-08	3.8E-06	mg/kg-day	1.0E-02	mg/kg-day	3.8E-04
				cis-1,2-Dichloroethene	1.2E+02	µg/L	4.1E-04	mg/kg-day	N/A		N/A	1.1E-03	mg/kg-day	2.0E-03	mg/kg-day	5.7E-01
				Tetrachloroethene	9.2E-01	µg/L	3.2E-06	mg/kg-day	5.4E-01	mg/kg-day	1.7E-06	9.0E-06	mg/kg-day	1.0E-02	mg/kg-day	9.0E-04
				trans-1,2-Dichloroethene	5.2E+01	µg/L	1.8E-04	mg/kg-day	N/A		N/A	5.1E-04	mg/kg-day	2.0E-02	mg/kg-day	2.5E-02
				Trichloroethene	1.1E+02	µg/L	3.9E-04	mg/kg-day	5.9E-03	mg/kg-day	2.3E-06	1.1E-03	mg/kg-day	N/A		N/A
				Vinyl chloride	1.0E+01	µg/L	3.6E-05	mg/kg-day	7.2E-01	mg/kg-day	2.6E-05	1.0E-04	mg/kg-day	3.0E-03	mg/kg-day	3.4E-02
			Exp. Route Total								8.6E-05					6.8E-01
		Exposure Point Total									8.6E-05					6.8E-01
	Exposure Medium Total										8.6E-05					6.8E-01
Groundwater Total											8.6E-05					6.8E-01
							Total of Receptor Risks Across All Media				9.6E-05	Total of Receptor Hazards Across All Media				7.7E-01

Notes:

* Soil = combined surface and subsurface soil.

1. Dermal absorption factors (DABs) used to calculated dermal absorption intake from soil are chemical specific. DABS of 0.03 used for arsenic, and 0.001 for rest of metals.

Appendix F

TABLE 7.6.RME

Calculation of Chemical Cancer Risks and Non-Cancer Hazards

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Receptor Population: Site Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Soil*	Soil*	Ingestion	Aluminum	1.7E+04	mg/kg	1.2E-03	mg/kg-day	N/A		N/A	3.5E-03	mg/kg-day	1.0E+00	mg/kg-day	3.5E-03
				Arsenic	6.8E+00	mg/kg	4.9E-07	mg/kg-day	1.5E+00	mg/kg-day	7.4E-07	1.4E-06	mg/kg-day	3.0E-04	mg/kg-day	4.6E-03
				Chromium	2.8E+01	mg/kg	2.0E-06	mg/kg-day	5.0E-01	mg/kg-day	1.0E-06	5.7E-06	mg/kg-day	3.0E-03	mg/kg-day	1.9E-03
				Iron	1.8E+04	mg/kg	1.3E-03	mg/kg-day	N/A		N/A	3.7E-03	mg/kg-day	7.0E-01	mg/kg-day	5.3E-03
				Vanadium	4.1E+01	mg/kg	3.0E-06	mg/kg-day	N/A		N/A	8.3E-06	mg/kg-day	5.0E-03	mg/kg-day	1.7E-03
			Exp. Route Total								1.8E-06					1.7E-02
			Dermal Absorption[1]	Aluminum	1.7E+04	mg/kg	8.2E-06	mg/kg-day	N/A	mg/kg-day	N/A	2.3E-05	mg/kg-day	1.0E+00	mg/kg-day	2.3E-05
				Arsenic	6.8E+00	mg/kg	9.8E-08	mg/kg-day	1.5E+00	mg/kg-day	1.5E-07	2.7E-07	mg/kg-day	3.0E-04	mg/kg-day	9.1E-04
				Chromium	2.8E+01	mg/kg	1.3E-08	mg/kg-day	2.0E+01	mg/kg-day	2.7E-07	3.7E-08	mg/kg-day	7.5E-05	mg/kg-day	5.0E-04
				Iron	1.8E+04	mg/kg	8.8E-06	mg/kg-day	N/A	mg/kg-day	N/A	2.5E-05	mg/kg-day	7.0E-01	mg/kg-day	3.5E-05
				Vanadium	4.1E+01	mg/kg	1.9E-08	mg/kg-day	N/A	mg/kg-day	N/A	5.5E-08	mg/kg-day	5.0E-03	mg/kg-day	1.1E-05
			Exp. Route Total								4.1E-07					1.5E-03
		Exposure Point Total									2.2E-06					1.8E-02
	Exposure Medium Total										2.2E-06					1.8E-02
	Air	Emissions from Soil*	Inhalation	Chromium	2.1E-05	$\mu g/m^3$	3.6E-07	$\mu g/m^3$	8.4E-02	$(\mu g/m^3)^{-1}$	3.0E-08	1.0E-09	mg/m^3	1.0E-04	mg/m^3	1.0E-05
			Exp. Route Total								3.0E-08					1.0E-05
		Exposure Point Total									3.0E-08					1.0E-05
	Exposure Medium Total										3.0E-08					1.0E-05
Soil* Total											2.2E-06					1.8E-02
							Total of Receptor Risks Across All Media				2.2E-06	Total of Receptor Hazards Across All Media				1.8E-02

Notes:

* Soil = combined surface and subsurface soil.

1. Dermal absorption factors (DABs) used to calculated dermal absorption intake from soil are chemical specific. DABS of 0.03 used for arsenic, and 0.001 for rest of metals.

Appendix F

TABLE 7.7.RME

Calculation of Chemical Cancer Risks and Non-Cancer Hazards

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Soil*	Soil*	Ingestion	Aluminum	1.7E+04	mg/kg	1.2E-03	mg/kg-day	N/A		N/A	3.5E-03	mg/kg-day	1.0E+00	mg/kg-day	3.5E-03
				Arsenic	6.8E+00	mg/kg	4.7E-07	mg/kg-day	1.5E+00	mg/kg-day	7.1E-07	1.4E-06	mg/kg-day	3.0E-04	mg/kg-day	4.6E-03
				Chromium	2.8E+01	mg/kg	1.9E-06	mg/kg-day	5.0E-01	mg/kg-day	9.7E-07	5.7E-06	mg/kg-day	3.0E-03	mg/kg-day	1.9E-03
				Iron	1.8E+04	mg/kg	1.3E-03	mg/kg-day	N/A		N/A	3.7E-03	mg/kg-day	7.0E-01	mg/kg-day	5.3E-03
				Vanadium	4.1E+01	mg/kg	2.8E-06	mg/kg-day	N/A		N/A	8.3E-06	mg/kg-day	5.0E-03	mg/kg-day	1.7E-03
			Exp. Route Total								1.7E-06					1.7E-02
			Dermal Absorption[1]	Aluminum	1.7E+04	mg/kg	4.7E-06	mg/kg-day	N/A	mg/kg-day	N/A	1.4E-05	mg/kg-day	1.0E+00	mg/kg-day	1.4E-05
				Arsenic	6.8E+00	mg/kg	5.7E-08	mg/kg-day	1.5E+00	mg/kg-day	8.5E-08	1.7E-07	mg/kg-day	3.0E-04	mg/kg-day	5.5E-04
				Chromium	2.8E+01	mg/kg	7.7E-09	mg/kg-day	2.0E+01	mg/kg-day	1.5E-07	2.3E-08	mg/kg-day	7.5E-05	mg/kg-day	3.0E-04
				Iron	1.8E+04	mg/kg	5.1E-06	mg/kg-day	N/A	mg/kg-day	N/A	1.5E-05	mg/kg-day	7.0E-01	mg/kg-day	2.1E-05
				Vanadium	4.1E+01	mg/kg	1.1E-08	mg/kg-day	N/A	mg/kg-day	N/A	3.3E-08	mg/kg-day	5.0E-03	mg/kg-day	6.6E-06
			Exp. Route Total								2.4E-07					8.9E-04
		Exposure Point Total									1.9E-06					1.8E-02
	Exposure Medium Total										1.9E-06					1.8E-02
	Air	Emissions from Soil*	Inhalation	Chromium	2.1E-05	µg/m³	8.6E-08	µg/m³	8.4E-02	(µg/m³)⁻¹	7.2E-09	2.5E-10	mg/m³	1.0E-04	mg/m³	2.5E-06
			Exp. Route Total								7.2E-09					2.5E-06
		Exposure Point Total									7.2E-09					2.5E-06
	Exposure Medium Total										7.2E-09					2.5E-06
Soil* Total											1.9E-06					1.8E-02
							Total of Receptor Risks Across All Media				1.9E-06	Total of Receptor Hazards Across All Media				1.8E-02

Notes:

* Soil = combined surface and subsurface soil.

1. Dermal absorption factors (DABs) used to calculated dermal absorption intake from soil are chemical specific. DABS of 0.03 used for arsenic, and 0.001 for rest of metals.

Appendix F

TABLE 7.8.RME

Calculation of Chemical Cancer Risks and Non-Cancer Hazards

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Receptor Population: Trespasser/Visitor
Receptor Age: Youth

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Soil*	Soil*	Ingestion	Aluminum	1.7E+04	mg/kg	7.7E-04	mg/kg-day	N/A		N/A	5.4E-03	mg/kg-day	1.0E+00	mg/kg-day	5.4E-03
				Arsenic	6.8E+00	mg/kg	3.1E-07	mg/kg-day	1.5E+00	mg/kg-day	4.6E-07	2.2E-06	mg/kg-day	3.0E-04	mg/kg-day	7.2E-03
				Chromium	2.8E+01	mg/kg	1.3E-06	mg/kg-day	5.0E-01	mg/kg-day	6.3E-07	8.8E-06	mg/kg-day	3.0E-03	mg/kg-day	2.9E-03
				Iron	1.8E+04	mg/kg	8.3E-04	mg/kg-day	N/A		N/A	5.8E-03	mg/kg-day	7.0E-01	mg/kg-day	8.3E-03
				Vanadium	4.1E+01	mg/kg	1.8E-06	mg/kg-day	N/A		N/A	1.3E-05	mg/kg-day	5.0E-03	mg/kg-day	2.6E-03
			Exp. Route Total								1.1E-06					2.6E-02
			Dermal Absorption[1]	Aluminum	1.7E+04	mg/kg	1.3E-06	mg/kg-day	N/A	mg/kg-day	N/A	9.0E-06	mg/kg-day	1.0E+00	mg/kg-day	9.0E-06
				Arsenic	6.8E+00	mg/kg	1.6E-08	mg/kg-day	1.5E+00	mg/kg-day	2.3E-08	1.1E-07	mg/kg-day	3.0E-04	mg/kg-day	3.6E-04
				Chromium	2.8E+01	mg/kg	2.1E-09	mg/kg-day	2.0E+01	mg/kg-day	4.2E-08	1.5E-08	mg/kg-day	7.5E-05	mg/kg-day	2.0E-04
				Iron	1.8E+04	mg/kg	1.4E-06	mg/kg-day	N/A	mg/kg-day	N/A	9.8E-06	mg/kg-day	7.0E-01	mg/kg-day	1.4E-05
				Vanadium	4.1E+01	mg/kg	3.1E-09	mg/kg-day	N/A	mg/kg-day	N/A	2.2E-08	mg/kg-day	5.0E-03	mg/kg-day	4.3E-06
			Exp. Route Total								6.5E-08					5.9E-04
		Exposure Point Total									1.2E-06					2.7E-02
	Exposure Medium Total										1.2E-06					2.7E-02
	Air	Emissions from Soil*	Inhalation	Chromium	2.1E-05	μg/m³	3.6E-08	μg/m³	8.4E-02	(μg/m³)⁻¹	3.0E-09	2.5E-10	mg/m³	1.0E-04	mg/m³	2.5E-06
			Exp. Route Total								3.0E-09					2.5E-06
		Exposure Point Total									3.0E-09					2.5E-06
	Exposure Medium Total										3.0E-09					2.5E-06
Soil* Total											1.2E-06					2.7E-02
							Total of Receptor Risks Across All Media				1.2E-06	Total of Receptor Hazards Across All Media				2.7E-02

Notes:

* Soil = combined surface and subsurface soil.

1. Dermal absorption factors (DABs) used to calculated dermal absorption intake from soil are chemical specific. DABS of 0.03 used for arsenic, and 0.001 for rest of metals.

Appendix F

TABLE 7.1.CTE

Calculation of Chemical Cancer Risks and Non-Cancer Hazards

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future

Receptor Population: Resident

Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Soil*	Soil*	Ingestion	Aluminum	1.6E+04	mg/kg	N/A		N/A		N/A	7.4E-03	mg/kg-day	1.0E+00	mg/kg-day	7.4E-03
				Arsenic	4.5E+00	mg/kg	N/A		N/A		N/A	2.0E-06	mg/kg-day	3.0E-04	mg/kg-day	6.8E-03
				Chromium	2.5E+01	mg/kg	N/A		N/A		N/A	1.1E-05	mg/kg-day	3.0E-03	mg/kg-day	3.7E-03
				Iron	1.2E+04	mg/kg	N/A		N/A		N/A	5.7E-03	mg/kg-day	7.0E-01	mg/kg-day	8.1E-03
				Vanadium	3.6E+01	mg/kg	N/A		N/A		N/A	1.6E-05	mg/kg-day	5.0E-03	mg/kg-day	3.3E-03
			Exp. Route Total								N/A					2.9E-02
			Dermal Absorption[1]	Aluminum	1.6E+04	mg/kg	N/A		N/A		N/A	8.4E-06	mg/kg-day	1.0E+00	mg/kg-day	8.4E-06
				Arsenic	4.5E+00	mg/kg	N/A		N/A		N/A	7.0E-08	mg/kg-day	3.0E-04	mg/kg-day	2.3E-04
				Chromium	2.5E+01	mg/kg	N/A		N/A		N/A	1.3E-08	mg/kg-day	7.5E-05	mg/kg-day	1.7E-04
				Iron	1.2E+04	mg/kg	N/A		N/A		N/A	6.5E-06	mg/kg-day	7.0E-01	mg/kg-day	9.3E-06
				Vanadium	3.6E+01	mg/kg	N/A		N/A		N/A	1.9E-08	mg/kg-day	5.0E-03	mg/kg-day	3.7E-06
			Exp. Route Total								N/A					4.2E-04
		Exposure Point Total									N/A					3.0E-02
	Exposure Medium Total										N/A					3.0E-02
	Air	Emissions from Soil*	Inhalation	Chromium	1.9E-05	µg/m³	N/A		N/A		N/A	1.2E-08	mg/m³	1.0E-04	mg/m³	1.2E-04
			Exp. Route Total								N/A					1.2E-04
		Exposure Point Total									N/A					1.2E-04
	Exposure Medium Total										N/A					1.2E-04
Soil* Total											N/A					3.0E-02
Groundwater	Groundwater	Tap Water	Ingestion	1,1,2,2-Tetrachloroethane	9.7E+00	µg/L	N/A		N/A		N/A	1.2E-04	mg/kg-day	2.0E-02	mg/kg-day	6.2E-03
				1,1,2-Trichloroethane	1.3E+00	µg/L	N/A		N/A		N/A	1.7E-05	mg/kg-day	4.0E-03	mg/kg-day	4.2E-03
				1,2-Dichloroethane	4.6E-01	µg/L	N/A		N/A		N/A	5.9E-06	mg/kg-day	6.0E-03	mg/kg-day	9.8E-04
				Benzene	8.1E-01	µg/L	N/A		N/A		N/A	1.0E-05	mg/kg-day	4.0E-03	mg/kg-day	2.6E-03
				Chloroform	3.2E-01	µg/L	N/A		N/A		N/A	4.1E-06	mg/kg-day	1.0E-02	mg/kg-day	4.1E-04
				cis-1,2-Dichloroethene	3.9E+01	µg/L	N/A		N/A		N/A	5.0E-04	mg/kg-day	2.0E-03	mg/kg-day	2.5E-01
				Tetrachloroethene	6.8E-01	µg/L	N/A		N/A		N/A	8.7E-06	mg/kg-day	1.0E-02	mg/kg-day	8.7E-04
				trans-1,2-Dichloroethene	2.6E+01	µg/L	N/A		N/A		N/A	3.4E-04	mg/kg-day	2.0E-02	mg/kg-day	1.7E-02
				Trichloroethene	4.9E+01	µg/L	N/A		N/A		N/A	6.3E-04	mg/kg-day	N/A	N/A	N/A
				Vinyl chloride	5.5E+00	µg/L	N/A		N/A		N/A	7.0E-05	mg/kg-day	3.0E-03	mg/kg-day	2.3E-02
			Exp. Route Total								N/A					3.0E-01
			Dermal Absorption[2]	1,1,2,2-Tetrachloroethane	9.7E+00	µg/L	N/A		N/A		N/A	1.5E-05	mg/kg-day	2.0E-02	mg/kg-day	7.4E-04
				1,1,2-Trichloroethane	1.3E+00	µg/L	N/A		N/A		N/A	1.5E-06	mg/kg-day	4.0E-03	mg/kg-day	3.7E-04
				1,2-Dichloroethane	4.6E-01	µg/L	N/A		N/A		N/A	2.7E-07	mg/kg-day	6.0E-03	mg/kg-day	4.5E-05
				Benzene	8.1E-01	µg/L	N/A		N/A		N/A	1.5E-06	mg/kg-day	4.0E-03	mg/kg-day	3.7E-04

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TABLE 7.1.CTE

Calculation of Chemical Cancer Risks and Non-Cancer Hazards

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
				Chloroform	3.2E-01	µg/L	N/A		N/A		N/A	3.5E-07	mg/kg-day	1.0E-02	mg/kg-day	3.5E-05
				cis-1,2-Dichloroethene	3.9E+01	µg/L	N/A		N/A		N/A	4.2E-05	mg/kg-day	2.0E-03	mg/kg-day	2.1E-02
				Tetrachloroethene	6.8E-01	µg/L	N/A		N/A		N/A	4.9E-06	mg/kg-day	1.0E-02	mg/kg-day	4.9E-04
				trans-1,2-Dichloroethene	2.6E+01	µg/L	N/A		N/A		N/A	2.8E-05	mg/kg-day	2.0E-02	mg/kg-day	1.4E-03
				Trichloroethene	4.9E+01	µg/L	N/A		N/A		N/A	9.9E-05	mg/kg-day	N/A	N/A	N/A
				Vinyl chloride	5.5E+00	µg/L	N/A		N/A		N/A	3.7E-06	mg/kg-day	3.0E-03	mg/kg-day	1.2E-03
			Exp. Route Total								N/A					2.5E-02
		Exposure Point Total									N/A					3.3E-01
	Exposure Medium Total										N/A					3.3E-01
	Air	Water Vapors at Showerhead	Inhalation[3]	1,1,2,2-Tetrachloroethane	9.7E+00	µg/L	N/A		N/A		N/A	3.8E-05	mg/m^3	N/A		N/A
				1,1,2-Trichloroethane	1.3E+00	µg/L	N/A		N/A		N/A	7.4E-06	mg/m^3	2.0E-04	mg/m^3	3.7E-02
				1,2-Dichloroethane	4.6E-01	µg/L	N/A		N/A		N/A	3.2E-06	mg/m^3	7.0E-03	mg/m^3	4.5E-04
				Benzene	8.1E-01	µg/L	N/A		N/A		N/A	7.2E-06	mg/m^3	3.0E-02	mg/m^3	2.4E-04
				Chloroform	3.2E-01	µg/L	N/A		N/A		N/A	2.3E-06	mg/m^3	9.8E-02	mg/m^3	2.3E-05
				cis-1,2-Dichloroethene	3.9E+01	µg/L	N/A		N/A		N/A	3.1E-04	mg/m^3	N/A		N/A
				Tetrachloroethene	6.8E-01	µg/L	N/A		N/A		N/A	4.3E-06	mg/m^3	2.7E-01	mg/m^3	1.6E-05
				trans-1,2-Dichloroethene	2.6E+01	µg/L	N/A		N/A		N/A	2.1E-04	mg/m^3	6.0E-02	mg/m^3	3.5E-03
				Trichloroethene	4.9E+01	µg/L	N/A		N/A		N/A	3.5E-04	mg/m^3	1.0E-02	mg/m^3	3.5E-02
				Vinyl chloride	5.5E+00	µg/L	N/A		N/A		N/A	5.5E-05	mg/m^3	1.0E-01	mg/m^3	5.5E-04
			Exp. Route Total								N/A					7.6E-02
		Exposure Point Total									N/A					7.6E-02
	Exposure Medium Total										N/A					7.6E-02
Groundwater Total											N/A					4.1E-01
							Total of Receptor Risks Across All Media				N/A	Total of Receptor Hazards Across All Media				4.4E-01

Notes:

* Soil = combined surface and subsurface soil.

1. Dermal absorption factors (DABs) used to calculated dermal absorption intake from soil are chemical specific. DABS of 0.03 used for arsenic, and 0.001 for rest of metals.

2. Dermal absorption from groundwater calculated on Table 7.1.CTE Supplement A.

3. Inhalation exposure while showering calculated on Table 7.1.CTE Supplement B

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TABLE 7.1.CTE Supplement A

Calculation of Chemical Cancer Risks and Non-Cancer Hazards

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Chemical of Potential Concern	Water Concentration (CW) (µg/L)	Permeability Coefficient (Kp) (cm/hr)	B (dimensionless)	Lag Time (τ_{event}) (hr)	t* (hr)	Fraction Absorbed Water (FA) (dimensionless)	Duration of Event (tevent) (hr)	DAevent (mg/cm^2-event)	Eq
1,1,2,2-Tetrachloroethane	9.7E+00	6.9E-03	3.5E-02	9.3E-01	2.2E+00	1.0E+00	0.25	9.0E-08	2
1,1,2-Trichloroethane	1.3E+00	6.4E-03	2.9E-02	6.0E-01	1.4E+00	1.0E+00	0.25	9.0E-09	2
1,2-Dichloroethane	4.6E-01	4.2E-03	1.6E-02	3.8E-01	9.2E-01	1.0E+00	0.25	1.6E-09	2
Benzene	8.1E-01	1.5E-02	5.1E-02	2.9E-01	7.0E-01	1.0E+00	0.25	9.0E-09	2
Chloroform	3.2E-01	6.8E-03	2.9E-02	5.0E-01	1.2E+00	1.0E+00	0.25	2.1E-09	2
cis-1,2-Dichloroethene[1]	3.9E+01	7.7E-03	2.9E-02	3.7E-01	8.9E-01	1.0E+00	0.25	2.5E-07	2
Tetrachloroethene	6.8E-01	3.3E-02	1.7E-01	9.1E-01	2.2E+00	1.0E+00	0.25	3.0E-08	2
trans-1,2-Dichloroethene	2.6E+01	7.7E-03	2.9E-02	3.7E-01	8.9E-01	1.0E+00	0.25	1.7E-07	2
Trichloroethene	4.9E+01	1.2E-02	5.1E-02	5.8E-01	1.4E+00	1.0E+00	0.25	6.0E-07	2
Vinyl chloride	5.5E+00	5.6E-03	1.7E-02	2.4E-01	5.7E-01	1.0E+00	0.25	2.2E-08	2

Inorganics: DA_{event} (mg/cm^2-event) =
K_p x CW x t_{event} x 0.001 mg/µg x 0.001 l/cm^3 (eq 1)

Organics: DA_{event} (mg/cm^2-event) =
If $t_{event}<t^*$, then DA_{event} =
2 x FA x K_p x CW x (sqrt((6 x τ_{event} x t_{event})/π)) x 0.001 mg/µg x 0.001 l/cm^3 (eq 2)

If $t_{event}>t^*$, then DA_{event} =
FA x K_p x CW x (t_{event}/(1+B) + 2 x τ_{event} x ((1 + 3xB + 3xB^2)/$(1+B)^2$) x 0.001 mg/µg x 0.001 l/cm^3 (eq 3)

Notes:
[1] trans-1,2-Dichloroethene values used as surrogate.
Parameter values from EPA 2004, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment - Final).* EPA/540/R/99/005.
B - Dimensionless ratio of the permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis (dimensionless).
t* - Time to reach steady-state

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TABLE 7.1.CTE Supplement B

Calculation of Chemical Cancer Risks and Non-Cancer Hazards

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Chemical of Potential Concern	Exposure Point Concentration Cwo (µg/L)	Molecular weight (MW) (g/mole)	Henry's Law Constant (H) (atm-m^3/mole)	Kg (VOC) (cm/hr)	Kl (VOC) (cm/hr)	KL (cm/hr)	Kal (cm/hr)	Cwd (µg/L)	S (µg/m^3 -min)	Ca (mg/m^3)
1,1,2,2-Tetrachloroethane	9.7E+00	1.7E+02	3.7E-04	9.8E+02	1.0E+01	6.1E+00	8.2E+00	6.4E-01	5.4E-01	5.7E-03
1,1,2-Trichloroethane	1.3E+00	1.3E+02	8.2E-04	1.1E+03	1.1E+01	8.8E+00	1.2E+01	1.2E-01	1.0E-01	1.1E-03
1,2-Dichloroethane	4.6E-01	9.9E+01	1.2E-03	1.3E+03	1.3E+01	1.1E+01	1.5E+01	5.3E-02	4.4E-02	4.7E-04
Benzene	8.1E-01	7.8E+01	5.6E-03	1.4E+03	1.5E+01	1.4E+01	1.9E+01	1.2E-01	1.0E-01	1.1E-03
Chloroform	3.2E-01	1.2E+02	3.7E-03	1.2E+03	1.2E+01	1.1E+01	1.5E+01	3.8E-02	3.2E-02	3.4E-04
cis-1,2-Dichloroethene	3.9E+01	9.7E+01	4.1E-03	1.3E+03	1.3E+01	1.3E+01	1.7E+01	5.2E+00	4.3E+00	4.6E-02
Tetrachloroethene	6.8E-01	1.7E+02	1.8E-02	9.9E+02	1.0E+01	1.0E+01	1.4E+01	7.3E-02	6.1E-02	6.5E-04
trans-1,2-Dichloroethene	2.6E+01	9.7E+01	4.1E-03	1.3E+03	1.3E+01	1.3E+01	1.7E+01	3.5E+00	2.9E+00	3.1E-02
Trichloroethene	4.9E+01	1.3E+02	9.9E-03	1.1E+03	1.2E+01	1.1E+01	1.5E+01	5.9E+00	4.9E+00	5.2E-02
Vinyl chloride	5.5E+00	6.3E+01	2.8E-02	1.6E+03	1.7E+01	1.7E+01	2.2E+01	9.3E-01	7.8E-01	8.3E-03

Variables	Units	Exposure Assumptions
Kg(VOC) = gas-film mass transfer coefficient	cm/hr	Solved by Eq 1
Kl(VOC) = liquid-film mass transfer coefficient	cm/hr	Solved by Eq 2
KL = overall mass transfer coefficient	cm/hr	Solved by Eq 3
Kal = adjusted overall mass transfer coeff.	cm/hr	Solved by Eq 4
Tl = Calibration temp. of water	K (20C +273)	293
Ts = Shower water temperature	k (45C)	318
Us = water viscosity at Ts	centipoise	0.596
Ul = water viscosity at Tl	cp	1.002
Cwd = conc. leaving droplets after time sdt	µg/l	Solved by Eq 5
sdt = shower droplet drop time	sec	0.5
d = shower droplet diameter	mm	1
FR = shower water flow rate	l/min	10
SV = shower room air volume	m^3	12
S = indoor VOC generation rate	µg/m^3-min	Solved by Eq 6
Ds = duration of shower	min	15
Dt = total duration in shower room	min	40
R = air exchange rate	min^{-1}	0.0083
Ca = indoor air concentration of VOCs	µg/m^3	Solved by Eq 7

Equation 1:	Kg(VOC) =	$3000 * (18 / MW)^{0.5}$	
Equation 2:	Kl(VOC) =	$20 * (44 / MW)^{0.5}$	
Equation 3:	KL =	$((1 / Kl(VOC)) + (0.024 / (Kg (VOC) * H)))^{-1}$	
Equation 4:	Kal =	$(KL * (((Tl * Us) / (Ts * Ul))^{-0.5}))$	
Equation 5:	Cwd =	(Cwo * (1-EXP((-1 * Kal * sdt)/(60 * d))))	
Equation 6:	S =	(Cwd * FR / SV)	
Equation 7:	Ca =	If t>Ds	[(S / R) * (Ds + (EXP(-R * Dt) / R) -(EXP(R *(Ds - Dt)) / R)] / Dt * 1/1000

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TABLE 7.2.CTE

Calculation of Chemical Cancer Risks and Non-Cancer Hazards

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Soil*	Soil*	Ingestion	Aluminum	1.6E+04	mg/kg	N/A		N/A		N/A	6.9E-02	mg/kg-day	1.0E+00	mg/kg/day	6.9E-02
				Arsenic	4.5E+00	mg/kg	N/A		N/A		N/A	1.9E-05	mg/kg-day	3.0E-04	mg/kg/day	6.3E-02
				Chromium	2.5E+01	mg/kg	N/A		N/A		N/A	1.0E-04	mg/kg-day	3.0E-03	mg/kg/day	3.5E-02
				Iron	1.2E+04	mg/kg	N/A		N/A		N/A	5.3E-02	mg/kg-day	7.0E-01	mg/kg/day	7.6E-02
				Vanadium	3.6E+01	mg/kg	N/A		N/A		N/A	1.5E-04	mg/kg-day	5.0E-03	mg/kg/day	3.1E-02
			Exp. Route Total								N/A					2.7E-01
			Dermal Absorption[1]	Aluminum	1.6E+04	mg/kg	N/A		N/A		N/A	7.7E-05	mg/kg-day	1.0E+00	mg/kg/day	7.7E-05
				Arsenic	4.5E+00	mg/kg	N/A		N/A		N/A	6.4E-07	mg/kg-day	3.0E-04	mg/kg/day	2.1E-03
				Chromium	2.5E+01	mg/kg	N/A		N/A		N/A	1.2E-07	mg/kg-day	7.5E-05	mg/kg/day	1.6E-03
				Iron	1.2E+04	mg/kg	N/A		N/A		N/A	5.9E-05	mg/kg-day	7.0E-01	mg/kg/day	8.5E-05
				Vanadium	3.6E+01	mg/kg	N/A		N/A		N/A	1.7E-07	mg/kg-day	5.0E-03	mg/kg/day	3.4E-05
			Exp. Route Total								N/A					3.9E-03
		Exposure Point Total									N/A					2.8E-01
	Exposure Medium Total										N/A					2.8E-01
	Air	Emissions from Soil*	Inhalation	Chromium	1.9E-05	µg/m³	N/A		N/A		N/A	1.2E-08	mg/m³	1.0E-04	mg/m³	1.2E-04
			Exp. Route Total								N/A					1.2E-04
		Exposure Point Total									N/A					1.2E-04
	Exposure Medium Total										N/A					1.2E-04
Soil* Total											N/A					2.8E-01
Groundwater	Groundwater	Tap Water	Ingestion	1,1,2,2-Tetrachloroethane	9.7E+00	µg/L	N/A		N/A		N/A	4.1E-04	mg/kg-day	2.0E-02	mg/kg/day	2.1E-02
				1,1,2-Trichloroethane	1.3E+00	µg/L	N/A		N/A		N/A	5.6E-05	mg/kg-day	4.0E-03	mg/kg/day	1.4E-02
				1,2-Dichloroethane	4.6E-01	µg/L	N/A		N/A		N/A	2.0E-05	mg/kg-day	6.0E-03	mg/kg/day	3.3E-03
				Benzene	8.1E-01	µg/L	N/A		N/A		N/A	3.5E-05	mg/kg-day	4.0E-03	mg/kg/day	8.6E-03
				Chloroform	3.2E-01	µg/L	N/A		N/A		N/A	1.4E-05	mg/kg-day	1.0E-02	mg/kg/day	1.4E-03
				cis-1,2-Dichloroethene	3.9E+01	µg/L	N/A		N/A		N/A	1.7E-03	mg/kg-day	2.0E-03	mg/kg/day	8.3E-01
				Tetrachloroethene	6.8E-01	µg/L	N/A		N/A		N/A	2.9E-05	mg/kg-day	1.0E-02	mg/kg/day	2.9E-03
				trans-1,2-Dichloroethene	2.6E+01	µg/L	N/A		N/A		N/A	1.1E-03	mg/kg-day	2.0E-02	mg/kg/day	5.6E-02
				Trichloroethene	4.9E+01	µg/L	N/A		N/A		N/A	2.1E-03	mg/kg-day	N/A	N/A	N/A
				Vinyl chloride	5.5E+00	µg/L	N/A		N/A		N/A	2.3E-04	mg/kg-day	3.0E-03	mg/kg/day	7.8E-02
			Exp. Route Total								N/A					1.0E+00
			Dermal Absorption[2]	1,1,2,2-Tetrachloroethane	9.7E+00	µg/L	N/A		N/A		N/A	2.9E-05	mg/kg-day	2.0E-02	mg/kg/day	1.5E-03
				1,1,2-Trichloroethane	1.3E+00	µg/L	N/A		N/A		N/A	2.9E-06	mg/kg-day	4.0E-03	mg/kg/day	7.3E-04
				1,2-Dichloroethane	4.6E-01	µg/L	N/A		N/A		N/A	5.3E-07	mg/kg-day	6.0E-03	mg/kg/day	8.9E-05
				Benzene	8.1E-01	µg/L	N/A		N/A		N/A	2.9E-06	mg/kg-day	4.0E-03	mg/kg/day	7.3E-04

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TABLE 7.2.CTE

Calculation of Chemical Cancer Risks and Non-Cancer Hazards

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
				Chloroform	3.2E-01	µg/L	N/A		N/A		N/A	6.9E-07	mg/kg-day	1.0E-02	mg/kg/day	6.9E-05
				cis-1,2-Dichloroethene	3.9E+01	µg/L	N/A		N/A		N/A	8.2E-05	mg/kg-day	2.0E-03	mg/kg/day	4.1E-02
				Tetrachloroethene	6.8E-01	µg/L	N/A		N/A		N/A	9.6E-06	mg/kg-day	1.0E-02	mg/kg/day	9.6E-04
				trans-1,2-Dichloroethene	2.6E+01	µg/L	N/A		N/A		N/A	5.6E-05	mg/kg-day	2.0E-02	mg/kg/day	2.8E-03
				Trichloroethene	4.9E+01	µg/L	N/A		N/A		N/A	2.0E-04	mg/kg-day	N/A	N/A	N/A
				Vinyl chloride	5.5E+00	µg/L	N/A		N/A		N/A	6.7E-06	mg/kg-day	3.0E-03	mg/kg/day	2.2E-03
			Exp. Route Total								N/A					5.0E-02
		Exposure Point Total									N/A					1.1E+00
	Exposure Medium Total										N/A					1.1E+00
	Air	Water Vapors at Showerhead	Inhalation[3]	1,1,2,2-Tetrachloroethane	9.7E+00	µg/L	N/A		N/A		N/A	5.8E-05	mg/m^3	N/A		N/A
				1,1,2-Trichloroethane	1.3E+00	µg/L	N/A		N/A		N/A	1.1E-05	mg/m^3	2.0E-04	mg/m^3	5.6E-02
				1,2-Dichloroethane	4.6E-01	µg/L	N/A		N/A		N/A	4.8E-06	mg/m^3	7.0E-03	mg/m^3	6.8E-04
				Benzene	8.1E-01	µg/L	N/A		N/A		N/A	1.1E-05	mg/m^3	3.0E-02	mg/m^3	3.6E-04
				Chloroform	3.2E-01	µg/L	N/A		N/A		N/A	3.4E-06	mg/m^3	9.8E-02	mg/m^3	3.5E-05
				cis-1,2-Dichloroethene	3.9E+01	µg/L	N/A		N/A		N/A	4.6E-04	mg/m^3	N/A		N/A
				Tetrachloroethene	6.8E-01	µg/L	N/A		N/A		N/A	6.6E-06	mg/m^3	2.7E-01	mg/m^3	2.4E-05
				trans-1,2-Dichloroethene	2.6E+01	µg/L	N/A		N/A		N/A	3.1E-04	mg/m^3	6.0E-02	mg/m^3	5.2E-03
				Trichloroethene	4.9E+01	µg/L	N/A		N/A		N/A	5.3E-04	mg/m^3	1.0E-02	mg/m^3	5.3E-02
				Vinyl chloride	5.5E+00	µg/L	N/A		N/A		N/A	8.4E-05	mg/m^3	1.0E-01	mg/m^3	8.4E-04
			Exp. Route Total								N/A					1.2E-01
		Exposure Point Total									N/A					1.2E-01
	Exposure Medium Total										N/A					1.2E-01
Groundwater Total											N/A					1.2E+00
							Total of Receptor Risks Across All Media				N/A	Total of Receptor Hazards Across All Media				1.5E+00

Notes:

* Soil = combined surface and subsurface soil.

1. Dermal absorption factors (DABs) used to calculated dermal absorption intake from soil are chemical specific. DABS of 0.03 used for arsenic, and 0.001 for rest of metals.

2. Dermal absorption from groundwater calculated on Table 7.2.CTE Supplement A.

3. Inhalation exposure while bathing calculated on Table 7.2.CTE Supplement B

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TABLE 7.2.CTE Supplement A

Calculation of Chemical Cancer Risks and Non-Cancer Hazards

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Chemical of Potential Concern	Water Concentration (CW) (µg/L)	Permeability Coefficient (Kp) (cm/hr)	B (dimensionless)	Lag Time (τ_{event}) (hr)	t* (hr)	Fraction Absorbed Water (FA) (dimensionless)	Duration of Event (tevent) (hr)	DAevent (mg/cm²-event)	Eq
1,1,2,2-Tetrachloroethane	9.7E+00	6.9E-03	3.5E-02	9.3E-01	2.2E+00	1.0E+00	0.33	1.0E-07	2
1,1,2-Trichloroethane	1.3E+00	6.4E-03	2.9E-02	6.0E-01	1.4E+00	1.0E+00	0.33	1.0E-08	2
1,2-Dichloroethane	4.6E-01	4.2E-03	1.6E-02	3.8E-01	9.2E-01	1.0E+00	0.33	1.9E-09	2
Benzene	8.1E-01	1.5E-02	5.1E-02	2.9E-01	7.0E-01	1.0E+00	0.33	1.0E-08	2
Chloroform	3.2E-01	6.8E-03	2.9E-02	5.0E-01	1.2E+00	1.0E+00	0.33	2.4E-09	2
cis-1,2-Dichloroethene[1]	3.9E+01	7.7E-03	2.9E-02	3.7E-01	8.9E-01	1.0E+00	0.33	2.9E-07	2
Tetrachloroethene	6.8E-01	3.3E-02	1.7E-01	9.1E-01	2.2E+00	1.0E+00	0.33	3.4E-08	2
trans-1,2-Dichloroethene	2.6E+01	7.7E-03	2.9E-02	3.7E-01	8.9E-01	1.0E+00	0.33	2.0E-07	2
Trichloroethene	4.9E+01	1.2E-02	5.1E-02	5.8E-01	1.4E+00	1.0E+00	0.33	6.9E-07	2
Vinyl chloride	5.5E+00	5.6E-03	1.7E-02	2.4E-01	5.7E-01	1.0E+00	0.33	2.4E-08	2

Inorganics: DA_{event} (mg/cm^2-event) =
K_p x CW x t_{event} x 0.001 mg/µg x 0.001 l/cm^3 (eq 1)

Organics: DA_{event} (mg/cm^2-event) =
If $t_{event} < t^*$, then DA_{event} =
$2 \times FA \times K_p \times CW \times (\mathrm{sqrt}((6 \times \tau_{event} \times t_{event})/\pi)) \times 0.001$ mg/µg x 0.001 l/cm^3 (eq 2)

If $t_{event} > t^*$, then DA_{event} =
$FA \times K_p \times CW \times (t_{event}/(1+B) + 2 \times \tau_{event} \times ((1 + 3xB + 3xB^2)/(1+B)^2) \times 0.001$ mg/µg x 0.001 l/cm^3 (eq 3)

Notes:
[1] trans-1,2-Dichloroethene values used as surrogate.
Parameter values from EPA 2004, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment - Final).* EPA/540/R/99/005.
B - Dimensionless ratio of the permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis (dimensionless).
t* - Time to reach steady-state

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TABLE 7.2.CTE Supplement B

Calculation of Chemical Cancer Risks and Non-Cancer Hazards

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Chemical of Potential Concern	Exposure Point Concentration Cwo (µg/L)	Molecular weight (MW) (g/mole)	Henry's Law Constant (H) (atm-m^3/mole)	Kg (VOC) (cm/hr)	Kl (VOC) (cm/hr)	KL (cm/hr)	Kal (cm/hr)	Cwd (µg/L)	S (µg/m^3 -min)	Ca (mg/m^3)
1,1,2,2-Tetrachloroethane	9.7E+00	1.7E+02	3.7E-04	9.8E+02	1.0E+01	6.1E+00	8.2E+00	6.4E-01	5.4E-01	6.5E-03
1,1,2-Trichloroethane	1.3E+00	1.3E+02	8.2E-04	1.1E+03	1.1E+01	8.8E+00	1.2E+01	1.2E-01	1.0E-01	1.3E-03
1,2-Dichloroethane	4.6E-01	9.9E+01	1.2E-03	1.3E+03	1.3E+01	1.1E+01	1.5E+01	5.3E-02	4.4E-02	5.4E-04
Benzene	8.1E-01	7.8E+01	5.6E-03	1.4E+03	1.5E+01	1.4E+01	1.9E+01	1.2E-01	1.0E-01	1.2E-03
Chloroform	3.2E-01	1.2E+02	3.7E-03	1.2E+03	1.2E+01	1.1E+01	1.5E+01	3.8E-02	3.2E-02	3.9E-04
cis-1,2-Dichloroethene	3.9E+01	9.7E+01	4.1E-03	1.3E+03	1.3E+01	1.3E+01	1.7E+01	5.2E+00	4.3E+00	5.2E-02
Tetrachloroethene	6.8E-01	1.7E+02	1.8E-02	9.9E+02	1.0E+01	1.0E+01	1.4E+01	7.3E-02	6.1E-02	7.4E-04
trans-1,2-Dichloroethene	2.6E+01	9.7E+01	4.1E-03	1.3E+03	1.3E+01	1.3E+01	1.7E+01	3.5E+00	2.9E+00	3.6E-02
Trichloroethene	4.9E+01	1.3E+02	9.9E-03	1.1E+03	1.2E+01	1.1E+01	1.5E+01	5.9E+00	4.9E+00	6.0E-02
Vinyl chloride	5.5E+00	6.3E+01	2.8E-02	1.6E+03	1.7E+01	1.7E+01	2.2E+01	9.3E-01	7.8E-01	9.5E-03

Variables	Units	Exposure Assumptions
Kg(VOC) = gas-film mass transfer coefficient	cm/hr	Solved by Eq 1
Kl(VOC) = liquid-film mass transfer coefficient	cm/hr	Solved by Eq 2
KL = overall mass transfer coefficient	cm/hr	Solved by Eq 3
Kal = adjusted overall mass transfer coeff.	cm/hr	Solved by Eq 4
Tl = Calibration temp. of water	K (20C +273)	293
Ts = Shower water temperature	k (45C)	318
Us = water viscosity at Ts	centipoise	0.596
Ul = water viscosity at Tl	cp	1.002
Cwd = conc. leaving droplets after time sdt	µg/l	Solved by Eq 5
sdt = shower droplet drop time	sec	0.5
d = shower droplet diameter	mm	1
FR = shower water flow rate	l/min	10
SV = shower room air volume	m^3	12
S = indoor VOC generation rate	µg/m^3-min	Solved by Eq 6
Ds = duration of shower	min	20
Dt = total duration in shower room	min	30
R = air exchange rate	min^{-1}	0.0083
Ca = indoor air concentration of VOCs	µg/m^3	Solved by Eq 7

Equation 1:	Kg(VOC) =	$3000 * (18 / MW)^{0.5}$	
Equation 2:	Kl(VOC) =	$20 * (44 / MW)^{0.5}$	
Equation 3:	KL =	$((1 / Kl(VOC)) + (0.024 / (Kg (VOC) * H)))^{-1}$	
Equation 4:	Kal =	$(KL * (((Tl * Us) / (Ts * Ul))^{-0.5}))$	
Equation 5:	Cwd =	(Cwo * (1-EXP((-1 * Kal * sdt)/(60 * d))))	
Equation 6:	S =	(Cwd * FR / SV)	
Equation 7:	Ca =	If t>Ds	[(S / R) * (Ds + (EXP(-R * Dt) / R) -(EXP(R *(Ds - Dt)) / R)] / Dt * 1/1000

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TABLE 7.3.CTE

Calculation of Chemical Cancer Risks and Non-Cancer Hazards

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Soil*	Soil*	Ingestion	Aluminum	1.6E+04	mg/kg	6.8E-03	mg/kg-day	N/A		N/A	N/A		N/A		N/A
				Arsenic	4.5E+00	mg/kg	1.9E-06	mg/kg-day	1.5E+00	mg/kg-day	2.8E-06	N/A		N/A		N/A
				Chromium[4]	2.5E+01	mg/kg			5.0E-01	mg/kg-day	2.6E-05	N/A		N/A		N/A
				Iron	1.2E+04	mg/kg	5.3E-03	mg/kg-day	N/A		N/A	N/A		N/A		N/A
				Vanadium	3.6E+01	mg/kg	1.5E-05	mg/kg-day	N/A		N/A	N/A		N/A		N/A
			Exp. Route Total								2.9E-05					N/A
			Dermal Absorption[1]	Aluminum	1.6E+04	mg/kg	7.7E-06	mg/kg-day	N/A		N/A	N/A		N/A		N/A
				Arsenic	4.5E+00	mg/kg	6.4E-08	mg/kg-day	1.5E+00	mg/kg-day	9.6E-08	N/A		N/A		N/A
				Chromium[4]	2.5E+01	mg/kg			2.0E+01	mg/kg-day	8.8E-05	N/A		N/A		N/A
				Iron	1.2E+04	mg/kg	5.9E-06	mg/kg-day	N/A		N/A	N/A		N/A		N/A
				Vanadium	3.6E+01	mg/kg	1.7E-08	mg/kg-day	N/A		N/A	N/A		N/A		N/A
			Exp. Route Total								8.8E-05					N/A
		Exposure Point Total									1.2E-04					N/A
	Exposure Medium Total										1.2E-04					N/A
	Air	Emissions from Soil*	Inhalation	Chromium[4]	1.9E-05	µg/m^3			8.4E-02	(µg/m3)-1	5.2E-07	N/A		N/A		N/A
			Exp. Route Total								5.2E-07					N/A
		Exposure Point Total									5.2E-07					N/A
	Exposure Medium Total										5.2E-07					N/A
Soil* Total											1.2E-04					N/A
Groundwater	Groundwater	Tap Water	Ingestion	1,1,2,2-Tetrachloroethane	9.7E+00	µg/L	5.2E-05	mg/kg-day	2.0E-01	mg/kg-day	1.0E-05	N/A		N/A		N/A
				1,1,2-Trichloroethane	1.3E+00	µg/L	7.0E-06	mg/kg-day	5.7E-02	mg/kg-day	4.0E-07	N/A		N/A		N/A
				1,2-Dichloroethane	4.6E-01	µg/L	2.4E-06	mg/kg-day	9.1E-02	mg/kg-day	2.2E-07	N/A		N/A		N/A
				Benzene	8.1E-01	µg/L	4.3E-06	mg/kg-day	5.5E-02	mg/kg-day	2.4E-07	N/A		N/A		N/A
				Chloroform	3.2E-01	µg/L	1.7E-06	mg/kg-day	3.1E-02	mg/kg-day	5.3E-08	N/A		N/A		N/A
				cis-1,2-Dichloroethene	3.9E+01	µg/L	2.1E-04	mg/kg-day	N/A		N/A	N/A		N/A		N/A
				Tetrachloroethene	6.8E-01	µg/L	3.6E-06	mg/kg-day	5.4E-01	mg/kg-day	1.9E-06	N/A		N/A		N/A
				trans-1,2-Dichloroethene	2.6E+01	µg/L	1.4E-04	mg/kg-day	N/A		N/A	N/A		N/A		N/A
				Trichloroethene	4.9E+01	µg/L	2.6E-04	mg/kg-day	5.9E-03	mg/kg-day	1.5E-06	N/A		N/A		N/A
				Vinyl chloride[4]	5.5E+00	µg/L			7.2E-01	mg/kg-day	3.7E-05	N/A		N/A		N/A
			Exp. Route Total								5.1E-05					N/A
			Dermal Absorption[2]	1,1,2,2-Tetrachloroethane	9.7E+00	µg/L	4.4E-06	mg/kg-day	2.0E-01	mg/kg-day	8.8E-07	N/A		N/A		N/A
				1,1,2-Trichloroethane	1.3E+00	µg/L	4.4E-07	mg/kg-day	5.7E-02	mg/kg-day	2.5E-08	N/A		N/A		N/A
				1,2-Dichloroethane	4.6E-01	µg/L	8.0E-08	mg/kg-day	9.1E-02	mg/kg-day	7.3E-09	N/A		N/A		N/A
				Benzene	8.1E-01	µg/L	4.4E-07	mg/kg-day	5.5E-02	mg/kg-day	2.4E-08	N/A		N/A		N/A

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TABLE 7.3.CTE

Calculation of Chemical Cancer Risks and Non-Cancer Hazards

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
				Chloroform	3.2E-01	μg/L	1.0E-07	mg/kg-day	3.1E-02	mg/kg-day	3.2E-09	N/A		N/A		N/A
				cis-1,2-Dichloroethene	3.9E+01	μg/L	1.2E-05	mg/kg-day	N/A		N/A	N/A		N/A		N/A
				Tetrachloroethene	6.8E-01	μg/L	1.5E-06	mg/kg-day	5.4E-01	mg/kg-day	7.9E-07	N/A		N/A		N/A
				trans-1,2-Dichloroethene	2.6E+01	μg/L	8.4E-06	mg/kg-day	N/A		N/A	N/A		N/A		N/A
				Trichloroethene	4.9E+01	μg/L	3.0E-05	mg/kg-day	5.9E-03	mg/kg-day	1.7E-07	N/A		N/A		N/A
				Vinyl chloride[4]	5.5E+00	μg/L			7.2E-01	mg/kg-day	6.3E-07	N/A		N/A		N/A
			Exp. Route Total								2.5E-06					N/A
		Exposure Point Total									5.4E-05					N/A
	Exposure Medium Total										5.4E-05					N/A
	Air	Water Vapors at Showerhead	Inhalation[3]	1,1,2,2-Tetrachloroethane	9.7E+00	μg/L	9.8E-03	$\mu g/m^3$	5.8E-05	$(\mu g/m^3)^{-1}$	5.7E-07	N/A		N/A		N/A
				1,1,2-Trichloroethane	1.3E+00	μg/L	1.9E-03	$\mu g/m^3$	1.6E-05	$(\mu g/m^3)^{-1}$	3.0E-08	N/A		N/A		N/A
				1,2-Dichloroethane	4.6E-01	μg/L	8.2E-04	$\mu g/m^3$	2.6E-05	$(\mu g/m^3)^{-1}$	2.1E-08	N/A		N/A		N/A
				Benzene	8.1E-01	μg/L	1.8E-03	$\mu g/m^3$	7.8E-06	$(\mu g/m^3)^{-1}$	1.4E-08	N/A		N/A		N/A
				Chloroform	3.2E-01	μg/L	5.9E-04	$\mu g/m^3$	2.3E-05	$(\mu g/m^3)^{-1}$	1.4E-08	N/A		N/A		N/A
				cis-1,2-Dichloroethene	3.9E+01	μg/L	7.9E-02	$\mu g/m^3$	N/A		N/A	N/A		N/A		N/A
				Tetrachloroethene	6.8E-01	μg/L	1.1E-03	$\mu g/m^3$	5.9E-06	$(\mu g/m^3)^{-1}$	6.6E-09	N/A		N/A		N/A
				trans-1,2-Dichloroethene	2.6E+01	μg/L	5.4E-02	$\mu g/m^3$	N/A		N/A	N/A		N/A		N/A
				Trichloroethene	4.9E+01	μg/L	9.0E-02	$\mu g/m^3$	2.0E-06	$(\mu g/m^3)^{-1}$	1.8E-07	N/A		N/A		N/A
				Vinyl chloride	5.5E+00	μg/L			4.4E-06	$(\mu g/m^3)^{-1}$	9.4E-08	N/A		N/A		N/A
			Exp. Route Total								9.3E-07					N/A
		Exposure Point Total									9.3E-07					N/A
	Exposure Medium Total										9.3E-07					N/A
Groundwater Total											5.5E-05					N/A
							Total of Receptor Risks Across All Media				1.7E-04	Total of Receptor Hazards Across All Media				N/A

Notes:

* Soil = combined surface and subsurface soil.

1. Dermal absorption factors (DABs) used to calculated dermal absorption intake from soil are chemical specific. DABS of 0.03 used for arsenic, and 0.001 for rest of metals.

2. Dermal absorption from groundwater calculated on Tables 7,1.CTE and 7.2.CTE Supplement A.

3. Inhalation exposure while bathing calculated on Tables 7.1.CTE and 7.2.CTE Supplement B

4. See Table 7.3.CTE Supplement A for calculation of intake and cancer risk following MMOA method.

Appendix F

TABLE 7.3.CTE Supplement A

Calculation of Chemical Cancer Risks For COPCs with Mutagenic Mode of Action

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult/Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations										
							Intake					CSF/Unit Risk					Cancer Risk
					Value	Units	Value				Units	Value				Units	
							0-2 yrs	2-6 yrs	6-16 years	16-30 yrs		0-2 yrs (ADAF=10)	2-6 yrs (ADAF=3)	6-16 yrs (ADAF=3)	16-30 yrs (ADAF=1)		
Soil*	Soil*	Soil*	Ingestion	Chromium	2.5E+01	mg/kg	3.0E-06	6.0E-06	1.4E-06		mg/kg/day	5.0E+00	1.5E+00	1.5E+00	5.0E-01	1/(mg/kg-day)	2.6E-05
			Dermal	Chromium	2.5E+01	mg/kg	3.4E-09	6.7E-09	1.4E-06		mg/kg/day	2.0E+02	6.0E+01	6.0E+01	2.0E+01	1/(mg/kg-day)	8.8E-05
	Air	Emissions from Soil*	Inhalation	Chromium	2.1E-05	μg/m^3	3.9E-07	7.7E-07	1.2E-12		ug/m^3	8.4E-01	2.5E-01	2.5E-01	8.4E-02	(μg/m^3)$^{-1}$	5.2E-07
Groundwater	Groundwater	Tap Water	Ingestion	Vinyl chloride	5.5E+00	ug/l	2.0E-05		9.0E-06		mg/kg/day	1.5E+00		7.2E-01		1/(mg/kg-day)	3.7E-05
			Dermal	Vinyl chloride	5.5E+00	ug/l	1.9E-07		4.7E-07		mg/kg/day	1.5E+00		7.2E-01		1/(mg/kg-day)	6.3E-07
			Inhalation	Vinyl chloride	5.5E+00	ug/l	7.2E-03		7.1E-03		ug/m^3	8.8E-06		4.4E-06		(μg/m^3)$^{-1}$	9.4E-08

Notes:
chromium - Cancer risk = ($Intake_{0-2}$ x CSF_{0-2}) + ($Intake_{2-6}$ x CSF_{2-6}) + ($Intake_{6-16}$ x CSF_{6-16}) + ($Intake_{16-30}$ x CSF_{16-30})
vinyl chloride - Cancer risk =($Intake_{0-6}$ x CSF_{0-6}) + ($Intake_{6-30}$ x CSF_{6-30})

Contaminant		Molecular Weight		Henry's Law Constants			Density		Diffusivity in Air		Diffusivity in Water		Organic Carbon		Water Solubility	
Analyte	CAS No.	MW	MW Ref	H` (unitless)	HLC (atm-m^3/mole)	H` and HLC Ref	Density (g/cm^3)	Density Ref	Dia (cm^2/s)	Dia Ref	Diw (cm^2/s)	Diw Ref	Koc (L/kg)	Koc Ref	S (mg/L)	S Ref
ALAR	1596-84-5	160.17	EPI	1.7294E-08	4.23E-10	EPI			0.064422	WATER9	7.5272E-06	WATER9	10	EPI	100000	EPI
Acephate	30560-19-1	183.16	EPI	2.048E-11	5.01E-13	EPI	1.35	CRC89	0.037354	WATER9	7.9758E-06	WATER9	10	EPI	818000	EPI
Acetaldehyde	75-07-0	44.05	EPI	0.0027269	0.0000667	EPI	0.7834	CRC89	0.12771	WATER9	0.0000135	WATER9	1	EPI	1000000	EPI
Acetochlor	34256-82-1	269.77	EPI	9.1169E-07	2.23E-08	EPI			0.045508	WATER9	5.3173E-06	WATER9	298.4	EPI	223	EPI
Acetone	67-64-1	58.08	EPI	0.0014309	0.000035	EPI	0.7845	CRC89	0.105923	WATER9	0.0000115	WATER9	2.364	EPI	1000000	EPI
Acetone Cyanohydrin	75-86-5	85.11	EPI	0.0005315	0.000013	EPI	0.932	CRC89	0.085946	WATER9	0.0000101	WATER9	1	EPI	1000000	EPI
Acetonitrile	75-05-8	41.05	EPI	0.0014105	0.0000345	EPI	0.7857	CRC89	0.134	WATER9	0.0000141	WATER9	4.67	EPI	1000000	EPI
Acetophenone	98-86-2	120.15	EPI	0.0004252	0.0000104	EPI	1.0281	CRC89	0.065222	WATER9	8.7229E-06	WATER9	51.85	EPI	6130	EPI
Acetylaminofluorene, 2-	53-96-3	223.28	EPI	7.8496E-09	1.92E-10	EPI			0.051624	WATER9	6.0319E-06	WATER9	2206	EPI	0	LANGE
Acrolein	107-02-8	56.06	EPI	0.0049877	0.000122	EPI	0.84	CRC89	0.111693	WATER9	0.0000122	WATER9	1	EPI	212000	EPI
Acrylamide	79-06-1	71.08	EPI	6.9501E-08	1.7E-09	EPI	1.222	LANGE	0.110399	WATER9	0.0000133	WATER9	5.694	EPI	390000	EPI
Acrylic Acid	79-10-7	72.06	EPI	0.0000151	0.00000037	EPI	1.0511	CRC89	0.102722	WATER9	0.000012	WATER9	1.44	EPI	1000000	EPI
Acrylonitrile	107-13-1	53.06	EPI	0.0056419	0.000138	EPI	0.8007	CRC89	0.11369	WATER9	0.0000123	WATER9	8.511	EPI	74500	EPI
Adiponitrile	111-69-3	108.14	EPI	4.9469E-08	1.21E-09	EPI	0.9676	CRC89	0.070778	WATER9	8.9598E-06	WATER9	20.18	EPI	80000	EPI
Alachlor	15972-60-8	269.77	EPI	3.4015E-07	8.32E-09	EPI	1.133	CRC89	0.022641	WATER9	5.6913E-06	WATER9	312.3	EPI	240	EPI
Aldicarb	116-06-3	190.26	EPI	5.8872E-08	1.44E-09	EPI	1.195	CRC89	0.031868	WATER9	7.2458E-06	WATER9	24.64	EPI	6030	EPI
Aldicarb Sulfone	1646-88-4	222.26	EPI	1.3778E-07	3.37E-09	EPI			0.051782	WATER9	6.0503E-06	WATER9	10	EPI	10000	EPI
Aldrin	309-00-2	364.92	EPI	0.0017989	0.000044	EPI			0.037207	WATER9	4.3473E-06	WATER9	82020	EPI	0.017	EPI
Ally	74223-64-6	381.37	EPI	5.397E-15	1.32E-16	EPI			0.036129	WATER9	4.2214E-06	WATER9	92.5	EPI	9500	EPI
Allyl Alcohol	107-18-6	58.08	EPI	0.000204	0.00000499	EPI	0.854	CRC89	0.109755	WATER9	0.0000121	WATER9	1.904	EPI	1000000	EPI
Allyl Chloride	107-05-1	76.53	EPI	0.4497138	0.011	EPI	0.9376	CRC89	0.093607	WATER9	0.0000108	WATER9	39.6	EPI	3370	EPI
Aluminum	7429-90-5	26.9815	EPI				2.7	CRC89								
Aluminum Phosphide	20859-73-8	57.96	EPI				2.4	CRC89								
Amdro	67485-29-4	494.49	EPI	0.0000899	0.0000022	EPI			0.030384	WATER9	3.5502E-06	WATER9	179700000	EPI	0.006	EPI
Ametryn	834-12-8	227.33	EPI	9.9346E-08	2.43E-09	EPI			0.051009	WATER9	0.00000596	WATER9	428.2	EPI	209	EPI
Aminobiphenyl, 4-	92-67-1	169.23	EPI	7.0728E-06	0.000000173	EPI			0.062102	WATER9	7.2561E-06	WATER9	2471	EPI	128.81	EPI
Aminophenol, m-	591-27-5	109.13	EPI	1.0957E-08	2.68E-10	EPI			0.0832	WATER9	9.7213E-06	WATER9	90.2	EPI	27000	EPI
Aminophenol, p-	123-30-8	109.13	EPI	1.4677E-08	3.59E-10	EPI			0.0832	WATER9	9.7213E-06	WATER9	90.2	EPI	16000	EPI
Amitraz	33089-61-1	293.42	EPI	0.0004035	0.00000987	EPI	1.128	CRC89	0.021614	WATER9	5.3971E-06	WATER9	257300	EPI	1	EPI
Ammonia	7664-41-7	17.03	EPI	0.0006582	0.0000161	PHYSPROP	0.696	CRC89							899000	PERRY
Ammonium Sulfamate	7773-06-0	97.09	EPI												147000	EPI
Aniline	62-53-3	93.13	EPI	0.0000826	0.00000202	EPI	1.0217	CRC89	0.083011	WATER9	0.0000101	WATER9	70.23	EPI	36000	EPI
Anthraquinone, 9,10-	84-65-1															
Antimony (metallic)	7440-36-0	121.75	EPI				6.68	CRC89								
Antimony Pentoxide	1314-60-9	323.517	CRC89				3.78	CRC89							3000	CRC89
Antimony Potassium Tartrate	11071-15-1	613.83	EPI												52600	EPI
Antimony Tetroxide	1332-81-6	307.52	EPI				6.64	CRC89								
Antimony Trioxide	1309-64-4	291.52	EPI				5.58	CRC89								
Apollo	74115-24-5	303.15	EPI	1.5944E-08	3.9E-10	EPI			0.042103	WATER9	4.9194E-06	WATER9	30210	EPI	1	EPI
Aramite	140-57-8	334.86	EPI	7.7678E-06	0.00000019	EPI	1.143	CRC89	0.02029	WATER9	5.0255E-06	WATER9	5550	EPI	2.5922	EPI
Arsenic, Inorganic	7440-38-2	74.9216	EPI				5.75	CRC89								
Arsine	7784-42-1	77.95	EPI				3.186	CRC89							200000	PERRY
Assure	76578-14-8	372.81	EPI	4.3336E-07	1.06E-08	EPI			0.03668	WATER9	4.2858E-06	WATER9	7736	EPI	0.3	EPI
Asulam	3337-71-1	230.24	EPI	6.991E-11	1.71E-12	EPI			0.050579	WATER9	5.9097E-06	WATER9	27.8	EPI	5000	EPI
Atrazine	1912-24-9	215.69	EPI	9.6484E-08	2.36E-09	EPI			0.052828	WATER9	6.1726E-06	WATER9	224.5	EPI	34.7	EPI
Auramine	492-80-8	267.38	EPI	1.4881E-07	3.64E-09	EPI			0.045779	WATER9	5.3489E-06	WATER9	4456	EPI	10000	EPI
Avermectin B1	65195-55-3	875.12	EPI	5.397E-26	1.32E-27	EPI			0.020767	WATER9	2.4265E-06	WATER9	876700	EPI	1.4194	EPI
Azobenzene	103-33-3	182.23	EPI	0.0005519	0.0000135	EPI	1.203	PERRY	0.035909	WATER9	7.4655E-06	WATER9	3759	EPI	6.4	EPI
Barium	7440-39-3	137.33	EPI				3.62	CRC89								
Baygon	114-26-1	209.25	EPI	5.8463E-08	1.43E-09	EPI	1.12	CRC89	0.025745	WATER9	6.5827E-06	WATER9	59.95	EPI	1860	EPI
Bayleton	43121-43-3	293.76	EPI	3.3156E-09	8.11E-11	EPI	1.22	CRC89	0.022429	WATER9	5.6532E-06	WATER9	298.5	EPI	71.5	EPI
Baythroid	68359-37-5	434.3	EPI	1.1856E-06	0.000000029	EPI			0.03313	WATER9	3.871E-06	WATER9	130600	EPI	0.003	EPI
Benefin	1861-40-1	335.29	EPI	0.011897	0.000291	EPI			0.039368	WATER9	4.5998E-06	WATER9	16390	EPI	0.1	EPI
Benomyl	17804-35-2	290.32	EPI	2.016E-10	4.93E-12	EPI			0.043335	WATER9	5.0633E-06	WATER9	336.2	EPI	3.8	EPI
Bentazon	25057-89-0	240.28	EPI	8.9125E-08	2.18E-09	EPI			0.04916	WATER9	5.7439E-06	WATER9	10	EPI	500	EPI

Benzaldehyde	100-52-7	106.13	EPI	0.0010916	0.0000267	EPI	1.0401	CRC89	0.074393	WATER9	9.4627E-06	WATER9	11.09	EPI	6950	EPI
Benzene	71-43-2	78.11	EPI	0.2269011	0.00555	EPI	0.8765	CRC89	0.089538	WATER9	0.0000103	WATER9	145.8	EPI	1790	EPI
Benzenediamine-2-methyl sulfate, 1,4-	6369-59-1															
Benzenethiol	108-98-5	110.17	EPI	0.0136958	0.000335	EPI	1.0775	CRC89	0.072863	WATER9	9.4511E-06	WATER9	233.9	EPI	835	EPI
Benzidine	92-87-5	184.24	EPI	2.8823E-09	7.05E-11	EPI			0.058681	WATER9	6.8564E-06	WATER9	1190	EPI	322	EPI
Benzoic Acid	65-85-0	122.12	EPI	1.5576E-06	3.81E-08	EPI	1.2659	CRC89	0.070194	WATER9	9.7868E-06	WATER9	16.55	EPI	3400	EPI
Benzotrichloride	98-07-7	195.48	EPI	0.0106296	0.00026	EPI	1.3723	CRC89	0.031256	WATER9	7.746E-06	WATER9	1001	EPI	53	EPI
Benzyl Alcohol	100-51-6	108.14	EPI	0.0000138	0.000000337	EPI	1.0419	CRC89	0.073119	WATER9	9.3665E-06	WATER9	21.46	EPI	42900	EPI
Benzyl Chloride	100-44-7	126.59	EPI	0.0168438	0.000412	EPI	1.1004	CRC89	0.063362	WATER9	8.8057E-06	WATER9	446.1	EPI	525	EPI
Beryllium and compounds	7440-41-7	9.01	EPI				1.85	CRC89								
Bidrin	141-66-2	237.19	EPI	2.0564E-09	5.03E-11	EPI	1.216	CRC89	0.025047	WATER9	6.4147E-06	WATER9	16.58	EPI	1000000	EPI
Bifenox	42576-02-3	342.14	EPI	4.4154E-06	0.000000108	EPI			0.038841	WATER9	4.5382E-06	WATER9	3679	EPI	0.398	EPI
Biphenthrin	82657-04-3	422.88	EPI	0.0000409	0.000001	EPI	1.2	CRC89	0.018376	WATER9	4.4983E-06	WATER9	2272000	EPI	0.1	EPI
Biphenyl, 1,1'-	92-52-4	154.21	EPI	0.012592	0.000308	EPI	1.04	CRC89	0.047059	WATER9	7.5618E-06	WATER9	5129	EPI	6.94	EPI
Bis(2-chloro-1-methylethyl) ether	108-60-1	171.07	EPI	0.0030335	0.0000742	EPI	1.103	CRC89	0.039889	WATER9	7.3606E-06	WATER9	82.92	EPI	1700	EPI
Bis(2-chloroethoxy)methane	111-91-1	173.04	EPI	0.0001574	0.00000385	EPI			0.061187	WATER9	7.1492E-06	WATER9	14.38	EPI	7800	EPI
Bis(2-chloroethyl)ether	111-44-4	143.01	EPI	0.000695	0.000017	EPI	1.22	CRC89	0.056719	WATER9	8.707E-06	WATER9	32.21	EPI	17200	EPI
Bis(2-ethylhexyl)phthalate	117-81-7	390.57	EPI	0.000011	0.00000027	EPI	0.981	CRC89	0.01734	WATER9	4.1807E-06	WATER9	119600	EPI	0.27	EPI
Bis(chloromethyl)ether	542-88-1	114.96	EPI	0.1782502	0.00436	EPI	1.323	CRC89	0.0763	WATER9	0.0000104	WATER9	9.699	EPI	22000	EPI
Bisphenol A	80-05-7	228.29	EPI	3.745E-10	9.16E-12	EPI			0.050866	WATER9	5.9433E-06	WATER9	37670	EPI	120	EPI
Boron And Borates Only	7440-42-8	13.84	EPI				2.34	CRC89								
Boron Trifluoride	7637-07-2	67.81	EPI				2.772	CRC89							3320000	EPI
Bromate	15541-45-4	79.9	EPI													
Bromo-2-chloroethane, 1-	107-04-0	143.41	EPI	0.0371627	0.000909	EPI	1.7392	CRC89	0.065925	WATER9	0.0000108	WATER9	39.6	EPI	6900	EPI
Bromobenzene	108-86-1	157.01	EPI	0.1009812	0.00247	EPI	1.495	CRC89	0.053713	WATER9	9.3004E-06	WATER9	233.9	EPI	446	EPI
Bromochloromethane	74-97-5	129.38	EPI	0.0596893	0.00146	EPI	1.9344	CRC89	0.078692	WATER9	0.0000122	WATER9	21.73	EPI	16700	EPI
Bromodichloromethane	75-27-4	163.83	EPI	0.0866721	0.00212	EPI	1.98	CRC89	0.056263	WATER9	0.0000107	WATER9	31.82	EPI	3030	EPI
Bromoform	75-25-2	252.73	EPI	0.0218724	0.000535	EPI	2.8788	CRC89	0.035732	WATER9	0.0000104	WATER9	31.82	EPI	3100	EPI
Bromomethane	74-83-9	94.94	EPI	0.3000818	0.00734	EPI	1.6755	CRC89	0.100497	WATER9	0.0000135	WATER9	13.22	EPI	15200	EPI
Bromophos	2104-96-3	365.99	EPI	0.008381	0.000205	EPI			0.037134	WATER9	4.3388E-06	WATER9	2019	EPI	0.3	EPI
Bromoxynil	1689-84-5	276.92	EPI	5.3966E-09	1.32E-10	EPI			0.044722	WATER9	5.2254E-06	WATER9	330.1	EPI	130	EPI
Bromoxynil Octanoate	1689-99-2	403.12	EPI	0.0013042	0.0000319	EPI			0.034818	WATER9	4.0681E-06	WATER9	4252	EPI	0.08	EPI
Butadiene, 1,3-	106-99-0	54.09	EPI	3.0089943	0.0736	EPI	0.6149	CRC89	0.100351	WATER9	0.0000103	WATER9	39.6	EPI	735	EPI
Butanol, N-	71-36-3	74.12	EPI	0.0003602	0.00000881	EPI	0.8095	CRC89	0.090042	WATER9	0.0000101	WATER9	3.471	EPI	63200	EPI
Butyl Benzyl Phthlate	85-68-7	312.37	EPI	0.0000515	0.00000126	EPI	1.119	CRC89	0.020832	WATER9	5.1733E-06	WATER9	7155	EPI	2.69	EPI
Butyl alcohol, sec-	78-92-2	74.12	EPI	0.0003704	0.00000906	EPI	0.8063	CRC89	0.089889	WATER9	0.0000101	WATER9	2.919	EPI	181000	EPI
Butylate	2008-41-5	217.37	EPI	0.0034546	0.0000845	EPI	0.9402	CRC89	0.023231	WATER9	5.7927E-06	WATER9	385.7	EPI	45	EPI
Butylated hydroxyanisole	25013-16-5	180.25	EPI	0.0000478	0.00000117	EPI			0.059544	WATER9	6.9572E-06	WATER9	840.7	EPI	742.97	EPI
Butylbenzene, n-	104-51-8	134.22	EPI	0.6500409	0.0159	EPI	0.8601	CRC89	0.052773	WATER9	7.3335E-06	WATER9	1482	EPI	11.8	EPI
Butylphthalyl Butylglycolate	85-70-1	336.39	EPI	1.2592E-07	3.08E-09	EPI	1.1	LANGE	0.019866	WATER9	4.8978E-06	WATER9	11240	EPI	8.4709	EPI
Cacodylic Acid	75-60-5	138	EPI						0.071149	WATER9	8.3132E-06	WATER9	43.89	EPI	2000000	EPI
Cadmium (Diet)	7440-43-9	112.41	EPI				8.69	CRC89								
Cadmium (Water)	7440-43-9	112.41	EPI				8.69	CRC89								
Caprolactam	105-60-2	113.16	EPI	1.0343E-06	2.53E-08	EPI	1.02	LANGE	0.069242	WATER9	8.9995E-06	WATER9	24.5	EPI	772000	EPI
Captafol	2425-06-1	349.06	EPI	2.0114E-07	4.92E-09	EPI			0.038325	WATER9	4.478E-06	WATER9	782.7	EPI	1.4	EPI
Captan	133-06-2	300.59	EPI	2.8618E-07	0.000000007	EPI	1.74	CRC89	0.026194	WATER9	6.8995E-06	WATER9	252.2	EPI	5.1	EPI
Carbaryl	63-25-2	201.23	EPI	1.3369E-07	3.27E-09	EPI	1.228	CRC89	0.027424	WATER9	7.1216E-06	WATER9	354.8	EPI	110	EPI
Carbofuran	1563-66-2	221.26	EPI	1.2633E-07	3.09E-09	EPI	1.18	CRC89	0.025615	WATER9	6.5684E-06	WATER9	95.25	EPI	320	EPI
Carbon Disulfide	75-15-0	76.13	EPI	0.5887163	0.0144	EPI	1.2632	CRC89	0.106447	WATER9	0.000013	WATER9	21.73	EPI	2160	EPI
Carbon Tetrachloride	56-23-5	153.82	EPI	1.1283729	0.0276	EPI	1.594	CRC89	0.057144	WATER9	9.7849E-06	WATER9	43.89	EPI	793	EPI
Carbosulfan	55285-14-8	380.55	EPI	0.0000209	0.000000512	EPI	1.056	CRC89	0.018239	WATER9	4.4384E-06	WATER9	11960	EPI	0.3	EPI
Carboxin	5234-68-4	235.3	EPI	1.3083E-08	3.2E-10	EPI			0.049851	WATER9	5.8247E-06	WATER9	169.4	EPI	147	EPI
Ceric oxide	1306-38-3	172.11	EPI				7.216	CRC89							107000	EPI
Chloral Hydrate	302-17-0	165.4	EPI	4.4563E-09	1.09E-10	EPI	1.9081	CRC89	0.054399	WATER9	0.0000104	WATER9	1	EPI	793000	EPI
Chloramben	133-90-4	206.03	EPI	1.5822E-09	3.87E-11	EPI			0.054467	WATER9	6.364E-06	WATER9	21.37	EPI	700	EPI
Chloranil	118-75-2	245.88	EPI	1.3369E-08	3.27E-10	EPI			0.04841	WATER9	5.6564E-06	WATER9	308.1	EPI	250	EPI
Chlordane	12789-03-6	409.78	EPI	0.0019869	0.0000486	EPI			0.034439	WATER9	4.0239E-06	WATER9	33780	EPI	0.056	EPI
Chlordecone (Kepone)	143-50-0	490.64	EPI	2.1995E-06	5.38E-08	EPI	1.61	CRC89	0.019647	WATER9	4.9081E-06	WATER9	17500	EPI	2.7	EPI
Chlorfenvinphos	470-90-6	359.58	EPI	1.1815E-06	2.89E-08	EPI			0.037574	WATER9	4.3903E-06	WATER9	1264	EPI	124	EPI

Chlorimuron, Ethyl-	90982-32-4	414.82	EPI	7.441E-14	1.82E-15	EPI			0.03416	WATER9	3.9913E-06	WATER9	71.79	EPI	1200	EPI
Chlorine	7782-50-5	70.91	EPI	0.4783	0.0117	PHYSPROP	2.898	CRC89							6300	EPI
Chlorine Dioxide	10049-04-4	67.45	EPI				2.757	CRC89								
Chlorite (Sodium Salt)	7758-19-2	90.44	EPI												640000	CRC89
Chloro-1,1-difluoroethane, 1-	75-68-3	100.5	EPI	2.4039248	0.0588	EPI	1.107	CRC89	0.080393	WATER9	0.0000101	WATER9	43.89	EPI	1400	EPI
Chloro-1,3-butadiene, 2-	126-99-8	88.54	EPI	2.2935405	0.0561	EPI	0.956	CRC89	0.084147	WATER9	0.00001	WATER9	60.7	EPI	836.92	EPI
Chloro-2-methylaniline HCl, 4-	3165-93-3	141.6	EPI	0.0000814	0.00000199	EPI			0.069938	WATER9	8.1717E-06	WATER9	184.5	EPI	1732.4	EPI
Chloro-2-methylaniline, 4-	95-69-2	141.6	EPI	0.0000814	0.00000199	EPI			0.069938	WATER9	8.1717E-06	WATER9	184.5	EPI	1732.4	EPI
Chloroacetaldehyde, 2-	107-20-0	78.5	EPI	0.00074	0.0000181	EPI	1.19	CRC89	0.101505	WATER9	0.0000123	WATER9	1	EPI	266780	EPI
Chloroacetic Acid	79-11-8	94.5	EPI	3.7858E-07	9.26E-09	EPI	1.4043	CRC89	0.093821	WATER9	0.0000121	WATER9	1.44	EPI	858000	EPI
Chloroacetophenone, 2-	532-27-4	154.6	EPI	0.0001349	0.0000033	EPI	1.324	CRC89	0.052239	WATER9	8.7273E-06	WATER9	98.9	EPI	1100	PERRY
Chloroaniline, p-	106-47-8	127.57	EPI	0.0000474	0.00000116	EPI	1.429	CRC89	0.070385	WATER9	0.0000103	WATER9	112.7	EPI	3900	EPI
Chlorobenzene	108-90-7	112.56	EPI	0.1271464	0.00311	EPI	1.1058	CRC89	0.072131	WATER9	9.4765E-06	WATER9	233.9	EPI	498	EPI
Chlorobenzilate	510-15-6	325.19	EPI	2.9599E-06	7.24E-08	EPI	1.2816	CRC89	0.021777	WATER9	5.4782E-06	WATER9	1539	EPI	13	EPI
Chlorobenzoic Acid, p-	74-11-3	156.57	EPI	1.5863E-06	3.88E-08	EPI	1.541	PERRY	0.054689	WATER9	9.487E-06	WATER9	26.56	EPI	72	EPI
Chlorobenzotrifluoride, 4-	98-56-6	180.56	EPI	1.4186427	0.0347	EPI	1.334	CRC89	0.0385	WATER9	7.9872E-06	WATER9	1606	EPI	11.723	EPI
Chlorobutane, 1-	109-69-3	92.57	EPI	0.6827473	0.0167	EPI	0.8857	CRC89	0.078413	WATER9	9.3274E-06	WATER9	72.17	EPI	1100	EPI
Chlorodifluoromethane	75-45-6	86.47	EPI	1.6598528	0.0406	EPI	1.4909	CRC89	0.103378	WATER9	0.0000133	WATER9	31.82	EPI	2770	EPI
Chloroform	67-66-3	119.38	EPI	0.1500409	0.00367	EPI	1.4788	CRC89	0.07692	WATER9	0.0000109	WATER9	31.82	EPI	7950	EPI
Chloromethane	74-87-3	50.49	EPI	0.3605887	0.00882	EPI	0.911	CRC89	0.123962	WATER9	0.0000136	WATER9	13.22	EPI	5320	EPI
Chloromethyl Methyl Ether	107-30-2	80.51	EPI	0.0124285	0.000304	EPI	1.063	CRC89	0.094973	WATER9	0.0000113	WATER9	5.322	EPI	192400	EPI
Chloronaphthalene, Beta-	91-58-7	162.62	EPI	0.0130826	0.00032	EPI	1.1377	CRC89	0.044691	WATER9	7.7301E-06	WATER9	2478	EPI	11.7	EPI
Chloronitrobenzene, o-	88-73-3	157.56	EPI	0.0003802	0.0000093	EPI	1.368	CRC89	0.051345	WATER9	8.7995E-06	WATER9	370.6	EPI	441	EPI
Chloronitrobenzene, p-	100-00-5	157.56	EPI	0.0001999	0.00000489	EPI	1.2979	CRC89	0.050159	WATER9	8.5261E-06	WATER9	363.2	EPI	225	EPI
Chlorophenol, 2-	95-57-8	128.56	EPI	0.0004579	0.0000112	EPI	1.2634	CRC89	0.066118	WATER9	9.4784E-06	WATER9	306.5	EPI	11300	EPI
Chloropicrin	76-06-2	164.38	EPI	0.0838103	0.00205	EPI	1.6558	CRC89	0.051764	WATER9	9.6198E-06	WATER9	44.19	EPI	1620	EPI
Chlorothalonil	1897-45-6	265.91	EPI	0.0000818	0.000002	EPI	1.7	CRC89	0.027579	WATER9	7.3232E-06	WATER9	1041	EPI	0.81	EPI
Chlorotoluene, o-	95-49-8	126.59	EPI	0.1459526	0.00357	EPI	1.0825	CRC89	0.062903	WATER9	8.7194E-06	WATER9	382.9	EPI	374	EPI
Chlorotoluene, p-	106-43-4	126.59	EPI	0.1790679	0.00438	EPI	1.0697	CRC89	0.062571	WATER9	8.6574E-06	WATER9	375.3	EPI	106	EPI
Chlorozotocin	54749-90-5	313.7	EPI	1.5E-20	3.67E-22	EPI			0.041154	WATER9	4.8085E-06	WATER9	10	EPI	1000000	EPI
Chlorpropham	101-21-3	213.67	EPI	0.0000233	0.000000569	EPI	1.18	CRC89	0.026089	WATER9	6.7074E-06	WATER9	350.7	EPI	89	EPI
Chlorpyrifos	2921-88-2	350.59	EPI	0.0001198	0.00000293	EPI			0.038214	WATER9	4.465E-06	WATER9	7283	EPI	1.12	EPI
Chlorpyrifos Methyl	5598-13-0	322.53	EPI	0.0001533	0.00000375	EPI			0.040399	WATER9	4.7203E-06	WATER9	2193	EPI	4.76	EPI
Chlorsulfuron	64902-72-3	357.77	EPI	1.398E-14	3.42E-16	EPI			0.037701	WATER9	4.405E-06	WATER9	322	EPI	31000	EPI
Chlorthiophos	60238-56-4	361.24	EPI	0.0000491	0.0000012	EPI			0.037459	WATER9	4.3768E-06	WATER9	12790	EPI	0.3	EPI
Chromium(III), Insoluble Salts	16065-83-1						5.22	CRC89								
Chromium(VI)	18540-29-9														1690000	CRC89
Chromium, Total	7440-47-3	52	EPI				7.15	CRC89								
Cobalt	7440-48-4	58.93	EPI				8.86	CRC89								
Coke Oven Emissions	8007-45-2	78.11	EPI	0.2269011	0.00555	EPI			0.10398	WATER9	0.0000121	WATER9	145.8	EPI	1790	EPI
Copper	7440-50-8	63.55	EPI				8.96	CRC89								
Cresol, m-	108-39-4	108.14	EPI	0.000035	0.000000856	EPI	1.0339	CRC89	0.072872	WATER9	9.3232E-06	WATER9	300.4	EPI	22700	EPI
Cresol, o-	95-48-7	108.14	EPI	0.0000491	0.0000012	EPI	1.0327	CRC89	0.072835	WATER9	9.3168E-06	WATER9	306.5	EPI	25900	EPI
Cresol, p-	106-44-5	108.14	EPI	0.0000409	0.000001	EPI	1.0185	CRC89	0.072394	WATER9	9.2397E-06	WATER9	300.4	EPI	21500	EPI
Cresol, p-chloro-m-	59-50-7	142.59	EPI	0.0001002	0.00000245	EPI			0.069614	WATER9	8.1338E-06	WATER9	491.8	EPI	3830	EPI
Cresols	1319-77-3	108.14	EPI	0.0000491	0.0000012	EPI			0.083707	WATER9	9.7805E-06	WATER9	306.5	EPI	25900	EPI
Crotonaldehyde, trans-	123-73-9	70.09	EPI	0.0007931	0.0000194	EPI	0.8516	CRC89	0.095926	WATER9	0.0000108	WATER9	1.793	EPI	150000	EPI
Cumene	98-82-8	120.2	EPI	0.4701554	0.0115	EPI	0.864	CRC89	0.060304	WATER9	7.8566E-06	WATER9	697.8	EPI	61.3	EPI
Cupferron	135-20-6	155.16	EPI	8.667E-16	2.12E-17	EPI			0.065801	WATER9	7.6883E-06	WATER9	762.4	EPI	204310	EPI
Cyanazine	21725-46-2	240.7	EPI	1.051E-10	2.57E-12	EPI			0.049102	WATER9	5.7372E-06	WATER9	134.1	EPI	170	EPI
Cyanides																
~Calcium Cyanide	592-01-8	92.11	EPI													
~Copper Cyanide	544-92-3	89.56	EPI				2.9	CRC89							23	EPI
~Cyanide (CN-)	57-12-5	27.03	EPI	0.0054374	0.000133	EPI			0.210955	WATER9	0.0000246	WATER9			1000000	EPI
~Cyanogen	460-19-5	52.04	EPI	0.2207686	0.0054	EPI	0.9537	CRC89	0.123753	WATER9	0.0000138	WATER9			4500000	PERRY
~Cyanogen Bromide	506-68-3	105.92	EPI				2.015	CRC89	0.098407	WATER9	0.0000141	WATER9				
~Cyanogen Chloride	506-77-4	61.47	EPI	0.0787186	0.0019412	YAWS	1.186	CRC89	0.120745	WATER9	0.0000142	WATER9			25000000	PERRY
~Hydrogen Cyanide	74-90-8	27.03	EPI	0.0054374	0.000133	EPI	0.6876	CRC89	0.167804	WATER9	0.0000168	WATER9			1000000	EPI
~Potassium Cyanide	151-50-8	65.12	EPI				1.55	CRC89							720000	EPI

~Potassium Silver Cyanide	506-61-6	199	EPI												
~Silver Cyanide	506-64-9	133.89	EPI				3.95	CRC89							23	EPI
~Sodium Cyanide	143-33-9	49.01	EPI				1.6	CRC89							582000	CRC89
~Thiocyanate	463-56-9	59.09	EPI	0.0059689	0.000146	EPI			0.12524	WATER9	0.0000146	WATER9	4.67	EPI	35319	EPI
~Zinc Cyanide	557-21-1	117.43	EPI				1.852	CRC89							17100	EPI
Cyclohexane	110-82-7	84.16	EPI	6.1324612	0.15	EPI	0.7739	CRC89	0.079975	WATER9	9.1079E-06	WATER9	145.8	EPI	55	EPI
Cyclohexane, 1,2,3,4,5-pentabromo-6-chloro-	87-84-3	513.09	EPI	4.374E-10	1.07E-11	EPI			0.029645	WATER9	3.4638E-06	WATER9	2807	EPI	0.45388	EPI
Cyclohexanone	108-94-1	98.15	EPI	0.0003679	0.000009	EPI	0.9478	CRC89	0.076757	WATER9	9.3792E-06	WATER9	17.38	EPI	25000	EPI
Cyclohexylamine	108-91-8	99.18	EPI	0.0001701	0.00000416	EPI	0.8191	CRC89	0.071293	WATER9	8.5392E-06	WATER9	32.17	EPI	1000000	EPI
Cyhalothrin/karate	68085-85-8	449.86	EPI	0.0000605	0.00000148	EPI			0.032362	WATER9	3.7812E-06	WATER9	341300	EPI	0.005	EPI
Cypermethrin	52315-07-8	416.31	EPI	0.0000172	0.00000042	EPI	1.25	CRC89	0.018905	WATER9	4.6534E-06	WATER9	79750	EPI	0.004	EPI
Cyromazine	66215-27-8	166.19	EPI	2.31E-12	5.65E-14	EPI			0.062857	WATER9	7.3443E-06	WATER9	28.73	EPI	13000	EPI
DDD	72-54-8	320.05	EPI	0.0002698	0.0000066	EPI			0.040608	WATER9	4.7447E-06	WATER9	117500	EPI	0.09	EPI
DDE, p,p'-	72-55-9	318.03	EPI	0.0017007	0.0000416	EPI			0.04078	WATER9	4.7648E-06	WATER9	117500	EPI	0.04	EPI
DDT	50-29-3	354.49	EPI	0.0003401	0.00000832	EPI			0.037933	WATER9	4.4322E-06	WATER9	168600	EPI	0.0055	EPI
Dacthal	1861-32-1	331.97	EPI	0.0000891	0.00000218	EPI			0.03963	WATER9	4.6304E-06	WATER9	511.1	EPI	0.5	EPI
Dalapon	75-99-0	142.97	EPI	2.314E-06	5.66E-08	EPI	1.389	CRC89	0.060081	WATER9	9.4134E-06	WATER9	3.231	EPI	502000	EPI
Decabromodiphenyl ether, 2,2',3,3',4,4',5,5',6,6'- (BDE-209)	1163-19-5	959.17	EPI	1.8193E-06	4.45E-08	EPI	3	IRIS Profile	0.019535	WATER9	2.2826E-06	WATER9	276200	EPI	0.0001	EPI
Demeton	8065-48-3	258.339	CRC89						0.046841	WATER9	5.473E-06	WATER9				
Di(2-ethylhexyl)adipate	103-23-1	370.58	EPI	0.0000177	0.000000434	EPI	0.922	CRC89	0.017291	WATER9	4.157E-06	WATER9	36000	EPI	0.78	EPI
Diallate	2303-16-4	270.22	EPI	0.0001554	0.0000038	EPI			0.045458	WATER9	5.3114E-06	WATER9	644.3	EPI	14	EPI
Diazinon	333-41-5	304.35	EPI	4.6198E-06	0.000000113	EPI	1.1088	CRC89	0.021026	WATER9	5.2259E-06	WATER9	3034	EPI	40	EPI
Dibromo-3-chloropropane, 1,2-	96-12-8	236.33	EPI	0.0060098	0.000147	EPI	2.093	CRC89	0.032135	WATER9	8.9048E-06	WATER9	115.8	EPI	1230	EPI
Dibromobenzene, 1,4-	106-37-6	235.91	EPI	0.0365086	0.000893	EPI	2.261	CRC89	0.033276	WATER9	9.3369E-06	WATER9	375.3	EPI	20	EPI
Dibromochloromethane	124-48-1	208.28	EPI	0.0320114	0.000783	EPI	2.451	CRC89	0.036636	WATER9	0.0000106	WATER9	31.82	EPI	2700	EPI
Dibromoethane, 1,2-	106-93-4	187.86	EPI	0.026574	0.00065	EPI	2.1683	CRC89	0.043035	WATER9	0.0000104	WATER9	39.6	EPI	3910	EPI
Dibromomethane (Methylene Bromide)	74-95-3	173.84	EPI	0.0336059	0.000822	EPI	2.4969	CRC89	0.055137	WATER9	0.0000119	WATER9	21.73	EPI	11900	EPI
Dibutyl Phthalate	84-74-2	278.35	EPI	0.000074	0.00000181	EPI	1.0465	CRC89	0.021436	WATER9	5.3255E-06	WATER9	1157	EPI	11.2	EPI
Dibutyltin Compounds	NA															
Dicamba	1918-00-9	221.04	EPI	8.9125E-08	2.18E-09	EPI	1.57	CRC89	0.029224	WATER9	7.8006E-06	WATER9	29.01	EPI	8310	EPI
Dichloro-2-butene, 1,4-	764-41-0	125	EPI	0.0271464	0.000664	EPI	1.188	LANGE	0.066505	WATER9	0.00000929	WATER9	131.5	EPI	580	EPI
Dichloro-2-butene, cis-1,4-	1476-11-5	125	EPI	0.0271464	0.000664	EPI	1.188	CRC89	0.066505	WATER9	0.00000929	WATER9	131.5	EPI	580	EPI
Dichloro-2-butene, trans-1,4-	110-57-6	125	EPI	0.0271464	0.000664	EPI	1.183	CRC89	0.066382	WATER9	9.2665E-06	WATER9	131.5	EPI	850	EPI
Dichloroacetic Acid	79-43-6	128.94	EPI	3.426E-07	8.38E-09	EPI	1.5634	CRC89	0.072234	WATER9	0.0000108	WATER9	2.252	EPI	1000000	EPI
Dichlorobenzene, 1,2-	95-50-1	147	EPI	0.0784955	0.00192	EPI	1.3059	CRC89	0.05617	WATER9	8.9213E-06	WATER9	382.9	EPI	156	EPI
Dichlorobenzene, 1,4-	106-46-7	147	EPI	0.0985282	0.00241	EPI	1.2475	CRC89	0.055043	WATER9	8.6797E-06	WATER9	375.3	EPI	81.3	EPI
Dichlorobenzidine, 3,3'-	91-94-1	253.13	EPI	1.64E-07	4.0114E-09	SSL			0.047482	WATER9	5.5478E-06	WATER9	3190	EPI	3.1	EPI
Dichlorobenzophenone, 4,4'-	90-98-2	251.11	EPI	0.0000437	0.00000107	EPI	1.45	CRC89	0.026393	WATER9	6.8893E-06	WATER9	2927	EPI	7.802	EPI
Dichlorodifluoromethane	75-71-8	120.91	EPI	14.022895	0.343	EPI	1.486	PERRY	0.076029	WATER9	0.0000108	WATER9	43.89	EPI	280	EPI
Dichloroethane, 1,1-	75-34-3	98.96	EPI	0.2297629	0.00562	EPI	1.1757	CRC89	0.083645	WATER9	0.0000106	WATER9	31.82	EPI	5040	EPI
Dichloroethane, 1,2-	107-06-2	98.96	EPI	0.048242	0.00118	EPI	1.2454	CRC89	0.085722	WATER9	0.000011	WATER9	39.6	EPI	8600	EPI
Dichloroethylene, 1,1-	75-35-4	96.94	EPI	1.0670482	0.0261	EPI	1.213	CRC89	0.086314	WATER9	0.000011	WATER9	31.82	EPI	2420	EPI
Dichloroethylene, 1,2- (Mixed Isomers)	540-59-0	96.94	EPI	0.1668029	0.00408	EPI	1.265	PERRY	0.087863	WATER9	0.0000112	WATER9	39.6	EPI	3500	EPI
Dichloroethylene, 1,2-cis-	156-59-2	96.94	EPI	0.1668029	0.00408	EPI	1.2837	CRC89	0.088409	WATER9	0.0000113	WATER9	39.6	EPI	6410	EPI
Dichloroethylene, 1,2-trans-	156-60-5	96.94	EPI	0.1668029	0.00408	EPI	1.2565	CRC89	0.087613	WATER9	0.0000112	WATER9	39.6	EPI	4520	EPI
Dichlorophenol, 2,4-	120-83-2	163	EPI	0.0001754	0.00000429	EPI	1.383	PERRY	0.048577	WATER9	8.6787E-06	WATER9	491.8	EPI	4500	EPI
Dichlorophenoxy Acetic Acid, 2,4-	94-75-7	221.04	EPI	1.4473E-06	3.54E-08	EPI			0.051972	WATER9	6.0726E-06	WATER9	29.63	EPI	677	EPI
Dichlorophenoxy)butyric Acid, 4-(2,4-	94-82-6	249.1	EPI	2.3998E-07	5.87E-09	EPI			0.047992	WATER9	5.6075E-06	WATER9	98.4	EPI	46	EPI
Dichloropropane, 1,2-	78-87-5	112.99	EPI	0.1152903	0.00282	EPI	1.159	PERRY	0.07334	WATER9	9.7252E-06	WATER9	60.7	EPI	2800	EPI
Dichloropropane, 1,3-	142-28-9	112.99	EPI	0.0399019	0.000976	EPI	1.1785	CRC89	0.073874	WATER9	9.823E-06	WATER9	72.17	EPI	2750	EPI
Dichloropropanol, 2,3-	616-23-9	128.99	EPI	1.48E-07	3.62E-09	EPI	1.3607	CRC89	0.068017	WATER9	0.00000989	WATER9	5.568	EPI	60820	EPI
Dichloropropene, 1,3-	542-75-6	110.97	EPI	0.1451349	0.00355	EPI	1.217	LANGE	0.076273	WATER9	0.0000101	WATER9	72.17	EPI	2800	EPI
Dichlorvos	62-73-7	220.98	EPI	0.0000235	0.000000574	EPI	1.415	CRC89	0.027877	WATER9	7.3302E-06	WATER9	53.96	EPI	8000	EPI
Dicyclopentadiene	77-73-6	132.21	EPI	2.5551922	0.0625	EPI	0.93	LANGE	0.055746	WATER9	7.7554E-06	WATER9	1513	EPI	13.687	EPI
Dieldrin	60-57-1	380.91	EPI	0.0004088	0.00001	EPI	1.75	CRC89	0.023287	WATER9	6.0062E-06	WATER9	20090	EPI	0.195	EPI
Diesel Engine Exhaust	NA															
Diethanolamine	111-42-2	105.14	EPI	1.5822E-09	3.87E-11	EPI	1.0966	CRC89	0.076805	WATER9	9.8229E-06	WATER9	1	EPI	1000000	EPI
Diethyl Phthalate	84-66-2	222.24	EPI	0.0000249	0.00000061	EPI	1.232	CRC89	0.026074	WATER9	6.7227E-06	WATER9	104.9	EPI	1080	EPI
Diethylene Glycol Monobutyl Ether	112-34-5	162.23	EPI	2.9436E-07	7.2E-09	EPI	0.9553	CRC89	0.041438	WATER9	6.9707E-06	WATER9	10	EPI	1000000	EPI

Diethylene Glycol Monoethyl Ether	111-90-0	134.18	EPI	9.1169E-07	2.23E-08	EPI	0.9885	CRC89	0.056241	WATER9	7.9734E-06	WATER9	1	EPI	1000000	EPI
Diethylformamide	617-84-5	101.15	EPI	5.3148E-06	0.00000013	EPI	0.908	CRC89	0.073301	WATER9	8.9773E-06	WATER9	2.06	EPI	1000000	EPI
Diethylstilbestrol	56-53-1	268.36	EPI	2.371E-10	5.8E-12	EPI			0.045668	WATER9	5.3359E-06	WATER9	274100	EPI	12	EPI
Difenzoquat	43222-48-6	360.43	EPI						0.037515	WATER9	4.3833E-06	WATER9	78380	EPI	817000	EPI
Diflubenzuron	35367-38-5	310.69	EPI	1.8806E-07	4.6E-09	EPI			0.041419	WATER9	4.8395E-06	WATER9	463.2	EPI	0.08	EPI
Difluoroethane, 1,1-	75-37-6	66.05	EPI	0.8299264	0.0203	EPI	0.896	CRC89	0.102316	WATER9	0.0000115	WATER9	31.82	EPI	3200	EPI
Dihydrosafrole	94-58-6	164.21	EPI	6.7457073	0.165	EPI			0.063361	WATER9	7.4032E-06	WATER9	207.2	EPI	5.7727	EPI
Diisopropyl Ether	108-20-3	102.18	EPI	0.1046607	0.00256	EPI	0.7192	CRC89	0.065423	WATER9	7.7582E-06	WATER9	22.79	EPI	8800	EPI
Diisopropyl Methylphosphonate	1445-75-6	180.19	EPI	0.0017907	0.0000438	EPI			0.059557	WATER9	6.9588E-06	WATER9	42.2	EPI	1500	EPI
Dimethipin	55290-64-7	210.26	EPI	9.403E-10	2.3E-11	EPI			0.053734	WATER9	6.2784E-06	WATER9	10	EPI	4600	EPI
Dimethoate	60-51-5	229.25	EPI	9.9346E-09	2.43E-10	EPI	1.277	CRC89	0.026086	WATER9	6.7422E-06	WATER9	12.77	EPI	23300	EPI
Dimethoxybenzidine, 3,3'-	119-90-4	244.3	EPI	1.9052E-09	4.66E-11	EPI			0.048619	WATER9	5.6807E-06	WATER9	508.8	EPI	60	EPI
Dimethyl methylphosphonate	756-79-6	124.08	EPI	0.0000511	0.00000125	EPI	1.1684	CRC89	0.06658	WATER9	9.2386E-06	WATER9	5.407	EPI	1000000	EPI
Dimethylamino azobenzene [p-]	60-11-7	225.3	EPI	9.5666E-06	0.000000234	EPI			0.051315	WATER9	5.9958E-06	WATER9	2028	EPI	0.23	EPI
Dimethylaniline HCl, 2,4-	21436-96-4	121.18	EPI	0.0001022	0.0000025	EPI			0.077589	WATER9	9.0657E-06	WATER9	184.5	EPI	2175.5	EPI
Dimethylaniline, 2,4-	95-68-1	121.18	EPI	0.0001022	0.0000025	EPI	0.9723	CRC89	0.063025	WATER9	8.3925E-06	WATER9	184.5	EPI	2175.5	EPI
Dimethylaniline, N,N-	121-69-7	121.18	EPI	0.0023222	0.0000568	EPI	0.9557	CRC89	0.062541	WATER9	8.3063E-06	WATER9	78.67	EPI	1450	EPI
Dimethylbenzidine, 3,3'-	119-93-7	212.3	EPI	3.3115E-09	8.1E-11	EPI			0.053389	WATER9	6.2381E-06	WATER9	3190	EPI	1300	EPI
Dimethylformamide	68-12-2	73.1	EPI	3.0213E-06	7.39E-08	EPI	0.9445	CRC89	0.09718	WATER9	0.0000112	WATER9	1	EPI	1000000	EPI
Dimethylhydrazine, 1,1-	57-14-7	60.1	EPI	2.8414E-06	6.95E-08	EPI	0.791	CRC89	0.103785	WATER9	0.0000113	WATER9	11.95	EPI	1000000	EPI
Dimethylhydrazine, 1,2-	540-73-8	60.1	EPI	2.8414E-06	6.95E-08	EPI	0.8274	CRC89	0.105769	WATER9	0.0000116	WATER9	14.87	EPI	1000000	EPI
Dimethylphenol, 2,4-	105-67-9	122.17	EPI	0.0000389	0.000000951	EPI	0.965	CRC89	0.062245	WATER9	8.314E-06	WATER9	491.8	EPI	7870	EPI
Dimethylphenol, 2,6-	576-26-1	122.17	EPI	0.0002719	0.00000665	EPI			0.077169	WATER9	9.0166E-06	WATER9	501.9	EPI	6050	EPI
Dimethylphenol, 3,4-	95-65-8	122.17	EPI	0.000017	0.000000415	EPI	0.983	CRC89	0.062762	WATER9	8.4067E-06	WATER9	491.8	EPI	4760	EPI
Dimethylterephthalate	120-61-6	194.19	EPI	0.0054783	0.000134	EPI	1.075	CRC89	0.028533	WATER9	6.7171E-06	WATER9	30.96	EPI	19	EPI
Dimethylvinylchloride	513-37-1	90.55	EPI	3.311529	0.081	EPI	0.9186	CRC89	0.081174	WATER9	9.6608E-06	WATER9	60.7	EPI	1000	EPI
Dinitro-o-cresol, 4,6-	534-52-1	198.14	EPI	0.0000572	0.0000014	EPI			0.055904	WATER9	6.5319E-06	WATER9	754.4	EPI	198	EPI
Dinitro-o-cyclohexyl Phenol, 4,6-	131-89-5	266.26	EPI	1.3818E-09	3.38E-11	EPI			0.045907	WATER9	5.3639E-06	WATER9	16540	EPI	15	EPI
Dinitrobenzene, 1,2-	528-29-0	168.11	EPI	2.1791E-06	5.33E-08	EPI	1.3119	CRC89	0.044718	WATER9	8.2538E-06	WATER9	358.8	EPI	133	EPI
Dinitrobenzene, 1,3-	99-65-0	168.11	EPI	2.0033E-06	0.000000049	EPI	1.5751	CRC89	0.048499	WATER9	9.2109E-06	WATER9	351.6	EPI	533	EPI
Dinitrobenzene, 1,4-	100-25-4	168.11	EPI	0.0000151	0.00000037	EPI	1.625	CRC89	0.049167	WATER9	9.3849E-06	WATER9	351.6	EPI	69	EPI
Dinitrophenol, 2,4-	51-28-5	184.11	EPI	3.5159E-06	0.000000086	EPI	1.683	CRC89	0.04067	WATER9	9.0756E-06	WATER9	460.8	EPI	2790	EPI
Dinitrotoluene Mixture, 2,4/2,6-	25321-14-6	182.14	EPI	0.0000162	0.000000397	EPI			0.059131	WATER9	6.909E-06	WATER9	587.4	EPI	270	EPI
Dinitrotoluene, 2,4-	121-14-2	182.14	EPI	2.2077E-06	0.000000054	EPI	1.3208	CRC89	0.037512	WATER9	7.8982E-06	WATER9	575.6	EPI	200	EPI
Dinitrotoluene, 2,6-	606-20-2	182.14	EPI	0.0000305	0.000000747	EPI	1.2833	CRC89	0.037026	WATER9	7.7629E-06	WATER9	587.4	EPI	182	SSL
Dinitrotoluene, 2-Amino-4,6-	35572-78-2	197.15	EPI	6.6231E-09	1.62E-10	EPI			0.056091	WATER9	6.5537E-06	WATER9	283	EPI	319.49	EPI
Dinitrotoluene, 4-Amino-2,6-	19406-51-0	197.15	EPI	6.6231E-09	1.62E-10	EPI			0.056091	WATER9	6.5537E-06	WATER9	283	EPI	319.49	EPI
Dinoseb	88-85-7	240.22	EPI	0.0000186	0.000000456	EPI	1.265	CRC89	0.025346	WATER9	6.5187E-06	WATER9	4294	EPI	52	EPI
Dioxane, 1,4-	123-91-1	88.11	EPI	0.0001962	0.0000048	EPI	1.0337	CRC89	0.087372	WATER9	0.0000105	WATER9	2.633	EPI	1000000	EPI
Dioxins																
~Hexachlorodibenzo-p-dioxin, Mixture	NA	390.87	EPI	0.000233	0.0000057	EPI							695200	EPI	0.000004	EPI
~TCDD, 2,3,7,8-	1746-01-6	321.98	EPI	0.0020442	0.00005	EPI			0.047028	WATER9	4.7257E-06	WATER9	249100	EPI	0.0002	EPI
Diphenamid	957-51-7	239.32	EPI	1.4841E-09	3.63E-11	EPI	1.17	CRC89	0.024483	WATER9	6.2344E-06	WATER9	4798	EPI	260	EPI
Diphenyl Sulfone	127-63-9	218.27	EPI	0.0000102	0.000000249	EPI	1.252	CRC89	0.026518	WATER9	6.8618E-06	WATER9	1109	EPI	0	LANGE
Diphenylamine	122-39-4	169.23	EPI	0.00011	0.00000269	EPI	1.158	CRC89	0.041706	WATER9	7.628E-06	WATER9	825.8	EPI	53	EPI
Diphenylhydrazine, 1,2-	122-66-7	184.24	EPI	0.0000195	0.000000478	EPI	1.158	CRC89	0.034312	WATER9	7.2488E-06	WATER9	1505	EPI	221	EPI
Diquat	85-00-7	344.05	EPI	5.805E-12	1.42E-13	EPI	1.24	CRC89	0.02081	WATER9	5.1922E-06	WATER9	9272	EPI	708000	EPI
Direct Black 38	1937-37-7	737.77	EPI	3.365E-38	8.23E-40	EPI			0.023271	WATER9	2.719E-06	WATER9	242000000	EPI	55.937	EPI
Direct Blue 6	2602-46-2	821.67	EPI	6.705E-42	1.64E-43	EPI			0.021658	WATER9	2.5306E-06	WATER9	790800000	EPI	8.2167E-07	EPI
Direct Brown 95	16071-86-6	760.11	EPI						0.022812	WATER9	2.6654E-06	WATER9	6985000	EPI	9.7133E-07	EPI
Disulfoton	298-04-4	274.39	EPI	0.0000883	0.00000216	EPI	1.144	CRC89	0.022543	WATER9	5.6664E-06	WATER9	837.9	EPI	16.3	EPI
Dithiane, 1,4-	505-29-3	120.23	EPI	0.0017171	0.000042	EPI			0.077997	WATER9	9.1133E-06	WATER9	145.8	EPI	3000	EPI
Diuron	330-54-1	233.1	EPI	2.0605E-08	5.04E-10	EPI			0.050164	WATER9	5.8613E-06	WATER9	109.1	EPI	42	EPI
Dodine	2439-10-3	287.45	EPI	3.6836E-09	9.01E-11	EPI			0.043623	WATER9	5.097E-06	WATER9	2482	EPI	630	EPI
EPTC	759-94-4	189.32	EPI	0.00065	0.0000159	EPI	0.9546	CRC89	0.029126	WATER9	6.3511E-06	WATER9	164.1	EPI	375	EPI
Endosulfan	115-29-7	406.92	EPI	0.0026574	0.000065	EPI	1.745	CRC89	0.022485	WATER9	5.7629E-06	WATER9	6761	EPI	0.325	EPI
Endothall	145-73-3	186.17	EPI	1.574E-14	3.85E-16	EPI	1.431	CRC89	0.036747	WATER9	8.1792E-06	WATER9	19.41	EPI	100000	EPI
Endrin	72-20-8	380.91	EPI	0.0004088	0.00001	EPI			0.036158	WATER9	4.2248E-06	WATER9	20090	EPI	0.25	EPI
Epichlorohydrin	106-89-8	92.53	EPI	0.0012428	0.0000304	EPI	1.183	PERRY	0.088865	WATER9	0.0000111	WATER9	9.907	EPI	65900	EPI

Epoxybutane, 1,2-	106-88-7	72.11	EPI	0.007359	0.00018	EPI	0.8297	CRC89	0.092894	WATER9	0.0000104	WATER9	9.907	EPI	95000	EPI
Ethephon	16672-87-0	144.5	EPI	2.33E-10	5.7E-12	EPI	1.2	CRC89	0.055477	WATER9	8.5676E-06	WATER9	5.028	EPI	1000000	EPI
Ethion	563-12-2	384.46	EPI	0.0000155	0.000000379	EPI	1.22	CRC89	0.019478	WATER9	4.8104E-06	WATER9	882	EPI	2	EPI
Ethoxyethanol Acetate, 2-	111-15-9	132.16	EPI	0.0001308	0.0000032	EPI	0.974	CRC89	0.05695	WATER9	7.9753E-06	WATER9	4.542	EPI	247000	EPI
Ethoxyethanol, 2-	110-80-5	90.12	EPI	0.0000192	0.00000047	EPI	0.9253	CRC89	0.081756	WATER9	9.7308E-06	WATER9	1	EPI	1000000	EPI
Ethyl Acetate	141-78-6	88.11	EPI	0.0054783	0.000134	EPI	0.9003	CRC89	0.082314	WATER9	9.7026E-06	WATER9	5.583	EPI	80000	EPI
Ethyl Acrylate	140-88-5	100.12	EPI	0.0138594	0.000339	EPI	0.9234	CRC89	0.074539	WATER9	9.1242E-06	WATER9	10.65	EPI	15000	EPI
Ethyl Chloride	75-00-3	64.52	EPI	0.4538021	0.0111	EPI	0.8902	CRC89	0.103754	WATER9	0.0000116	WATER9	21.73	EPI	6710	EPI
Ethyl Ether	60-29-7	74.12	EPI	0.0502862	0.00123	EPI	0.7138	CRC89	0.085248	WATER9	9.3639E-06	WATER9	9.699	EPI	60400	EPI
Ethyl Methacrylate	97-63-2	114.15	EPI	0.023426	0.000573	EPI	0.9135	CRC89	0.065344	WATER9	8.3794E-06	WATER9	16.66	EPI	5400	EPI
Ethyl-p-nitrophenyl Phosphonate	2104-64-5	323.31	EPI	0.0000182	0.000000444	EPI	1.27	CRC89	0.021748	WATER9	5.4674E-06	WATER9	15470	EPI	3.11	EPI
Ethylbenzene	100-41-4	106.17	EPI	0.3221586	0.00788	EPI	0.8626	CRC89	0.068465	WATER9	8.4558E-06	WATER9	446.1	EPI	169	EPI
Ethylene Cyanohydrin	109-78-4	71.08	EPI	3.0662E-07	7.5E-09	EPI	1.0404	CRC89	0.10331	WATER9	0.000012	WATER9	1	EPI	1000000	EPI
Ethylene Diamine	107-15-3	60.1	EPI	7.0728E-08	1.73E-09	EPI	0.8979	CRC89	0.109445	WATER9	0.0000122	WATER9	14.87	EPI	1000000	EPI
Ethylene Glycol	107-21-1	62.07	EPI	2.453E-06	0.00000006	EPI	1.1135	CRC89	0.116924	WATER9	0.0000136	WATER9	1	EPI	1000000	EPI
Ethylene Glycol Monobutyl Ether	111-76-2	118.18	EPI	0.0000654	0.0000016	EPI	0.9015	CRC89	0.062619	WATER9	8.1419E-06	WATER9	2.823	EPI	1000000	EPI
Ethylene Oxide	75-21-8	44.05	EPI	0.0060507	0.000148	EPI	0.8821	CRC89	0.133972	WATER9	0.0000145	WATER9	3.237	EPI	1000000	EPI
Ethylene Thiourea	96-45-7	102.15	EPI	0.0000137	0.000000336	EPI			0.086948	WATER9	0.0000102	WATER9	12.97	EPI	20000	EPI
Ethyleneimine	151-56-4	43.07	EPI	0.0004947	0.0000121	EPI	0.832	CRC89	0.132827	WATER9	0.0000142	WATER9	9.043	EPI	1000000	EPI
Ethylphthalyl Ethyl Glycolate	84-72-0	280.28	EPI	3.1603E-08	7.73E-10	EPI			0.044364	WATER9	5.1835E-06	WATER9	1019	EPI	992.56	EPI
Express	0	395.39	EPI	4.17E-12	1.02E-13	EPI			0.03527	WATER9	4.121E-06	WATER9	94.69	EPI	50	EPI
Fenamiphos	22224-92-6	303.36	EPI	4.9469E-08	1.21E-09	EPI	1.15	CRC89	0.021437	WATER9	5.352E-06	WATER9	398	EPI	329	EPI
Fenpropathrin	39515-41-8	349.43	EPI	0.0003123	0.00000764	EPI			0.038298	WATER9	4.4749E-06	WATER9	22490	EPI	0.33	EPI
Fluometuron	2164-17-2	232.21	EPI	1.067E-07	2.61E-09	EPI			0.050292	WATER9	5.8762E-06	WATER9	285.3	EPI	110	EPI
Fluoride	16984-48-8	38	EPI												1.69	EPI
Fluorine (Soluble Fluoride)	7782-41-4	38	EPI				1.553	CRC89							1.69	EPI
Fluridone	59756-60-4	329.32	EPI	3.3115E-07	8.1E-09	EPI			0.039842	WATER9	4.6552E-06	WATER9	56770	EPI	12	EPI
Flurprimidol	56425-91-3	312.29	EPI	5.3557E-08	1.31E-09	EPI			0.041278	WATER9	4.823E-06	WATER9	2189	EPI	114	EPI
Flutolanil	66332-96-5	323.32	EPI	1.3001E-07	3.18E-09	EPI			0.040333	WATER9	4.7126E-06	WATER9	2558	EPI	6.53	EPI
Fluvalinate	69409-94-5	502.92	EPI	5.928E-07	1.45E-08	EPI			0.030044	WATER9	3.5104E-06	WATER9	730000	EPI	0.005	EPI
Folpet	133-07-3	296.56	EPI	3.1316E-06	7.66E-08	EPI			0.042725	WATER9	4.992E-06	WATER9	17.7	EPI	0.8	EPI
Fomesafen	72178-02-0	438.76	EPI	3.078E-11	7.53E-13	EPI	1.28	CRC89	0.018607	WATER9	4.5736E-06	WATER9	1546	EPI	50	EPI
Fonofos	944-22-9	246.32	EPI	0.0002854	0.00000698	EPI	1.16	CRC89	0.024017	WATER9	6.096E-06	WATER9	855.8	EPI	15.7	EPI
Formaldehyde	50-00-0	30.03	EPI	0.0000138	0.000000337	EPI	0.815	CRC89	0.167073	WATER9	0.0000174	WATER9	1	EPI	400000	EPI
Formic Acid	64-18-6	46.03	EPI	6.8275E-06	0.000000167	EPI	1.22	CRC89	0.147862	WATER9	0.0000172	WATER9	1	EPI	1000000	EPI
Fosetyl-AL	39148-24-8	354.11	EPI						0.03796	WATER9	4.4353E-06	WATER9	6485	EPI	111000	EPI
Furans																
~Dibenzofuran	132-64-9	168.2	EPI	0.0087081	0.000213	EPI	1.0886	CRC89	0.04105	WATER9	7.3773E-06	WATER9	9161	EPI	3.1	EPI
~Furan	110-00-9	68.08	EPI	0.2207686	0.0054	EPI	0.9514	CRC89	0.102673	WATER9	0.0000117	WATER9	79.99	EPI	10000	EPI
Furazolidone	67-45-8	225.16	EPI	1.3328E-09	3.26E-11	EPI			0.051337	WATER9	5.9983E-06	WATER9	858.4	EPI	40	EPI
Furfural	98-01-1	96.09	EPI	0.0001541	0.00000377	EPI	1.1594	CRC89	0.085318	WATER9	0.0000107	WATER9	6.083	EPI	74100	EPI
Furium	531-82-8	253.23	EPI	5.437E-14	1.33E-15	EPI			0.047469	WATER9	5.5464E-06	WATER9	577.6	EPI	4205.3	EPI
Furmecyclox	60568-05-0	251.33	EPI	2.8168E-07	6.89E-09	EPI			0.047708	WATER9	5.5743E-06	WATER9	429	EPI	0.3	EPI
Glufosinate, Ammonium	77182-82-2	198.16	EPI	1.034E-22	2.53E-24	EPI			0.0559	WATER9	6.5314E-06	WATER9	10	EPI	1370000	EPI
Glutaraldehyde	111-30-8	100.12	EPI	9.7711E-07	2.39E-08	EPI			0.08812	WATER9	0.0000103	WATER9	1	EPI	709980	EPI
Glycidyl	765-34-4	72.06	EPI	0.0000321	0.000000784	EPI	1.1403	CRC89	0.106251	WATER9	0.0000126	WATER9	1	EPI	1000000	EPI
Glyphosate	1071-83-6	169.07	EPI	8.585E-11	2.1E-12	EPI			0.062141	WATER9	7.2606E-06	WATER9	1	EPI	10500	EPI
Goal	42874-03-3	361.71	EPI	0.0000335	0.00000082	EPI	1.35	CRC89	0.021124	WATER9	5.3022E-06	WATER9	39900	EPI	0.116	EPI
Guthion	86-50-0	317.32	EPI	9.7711E-07	2.39E-08	EPI	1.44	CRC89	0.023317	WATER9	5.962E-06	WATER9	51.93	EPI	20.9	EPI
Haloxyfop, Methyl	69806-40-2	375.73	EPI	0.000013	0.000000319	EPI			0.03649	WATER9	4.2635E-06	WATER9	5454	EPI	9.3	EPI
Harmony	79277-27-3	387.39	EPI	1.668E-12	4.08E-14	EPI			0.035754	WATER9	4.1775E-06	WATER9	50.76	EPI	2240	EPI
Heptachlor	76-44-8	373.32	EPI	0.0120196	0.000294	EPI	1.57	CRC89	0.022344	WATER9	5.6959E-06	WATER9	41260	EPI	0.18	EPI
Heptachlor Epoxide	1024-57-3	389.32	EPI	0.0008585	0.000021	EPI			0.035636	WATER9	4.1637E-06	WATER9	10110	EPI	0.2	EPI
Hexabromobenzene	87-82-1	551.49	EPI	0.0011488	0.0000281	EPI			0.028253	WATER9	3.3011E-06	WATER9	2807	EPI	0.00016	EPI
Hexabromodiphenyl ether, 2,2',4,4',5,5'- (BDE-153)	68631-49-2														0.0009	IRIS Profile
Hexachlorobenzene	118-74-1	284.78	EPI	0.0695012	0.0017	EPI	2.044	CRC89	0.028975	WATER9	7.8497E-06	WATER9	6195	EPI	0.0062	EPI
Hexachlorobutadiene	87-68-3	260.76	EPI	0.4210957	0.0103	EPI	1.556	CRC89	0.026745	WATER9	7.0264E-06	WATER9	845.2	EPI	3.2	EPI
Hexachlorocyclohexane, Alpha-	319-84-6	290.83	EPI	0.0002101	0.00000514	EPI			0.043284	WATER9	5.0574E-06	WATER9	2807	EPI	2	EPI
Hexachlorocyclohexane, Beta-	319-85-7	290.83	EPI	0.0002101	0.00000514	EPI	1.89	CRC89	0.027667	WATER9	7.3955E-06	WATER9	2807	EPI	0.24	EPI

Hexachlorocyclohexane, Gamma- (Lindane)	58-89-9	290.83	EPI	0.0002101	0.00000514	EPI			0.043284	WATER9	5.0574E-06	WATER9	2807	EPI	7.3	EPI
Hexachlorocyclohexane, Technical	608-73-1	290.83	EPI	0.0002101	0.00000514	EPI			0.043284	WATER9	5.0574E-06	WATER9	2807	EPI	8	EPI
Hexachlorocyclopentadiene	77-47-4	272.77	EPI	1.103843	0.027	EPI	1.7019	CRC89	0.027238	WATER9	7.217E-06	WATER9	1404	EPI	1.8	EPI
Hexachloroethane	67-72-1	236.74	EPI	0.1590352	0.00389	EPI	2.091	CRC89	0.032094	WATER9	8.8904E-06	WATER9	196.8	EPI	50	EPI
Hexachlorophene	70-30-4	406.91	EPI	2.24E-11	5.48E-13	EPI			0.034601	WATER9	4.0428E-06	WATER9	668600	EPI	140	EPI
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	121-82-4	222.12	EPI	8.217E-10	2.01E-11	EPI	1.82	CRC89	0.031154	WATER9	8.4989E-06	WATER9	89.07	EPI	59.7	EPI
Hexamethylene Diisocyanate, 1,6-	822-06-0	168.2	EPI	0.0019624	0.000048	EPI	1.0528	CRC89	0.040426	WATER9	7.2308E-06	WATER9	4818	EPI	179.03	EPI
Hexane, N-	110-54-3	86.18	EPI	73.589534	1.8	EPI	0.6606	CRC89	0.073106	WATER9	8.1657E-06	WATER9	131.5	EPI	9.5	EPI
Hexanedioic Acid	124-04-9	146.14	EPI	1.926E-10	4.71E-12	EPI	1.36	CRC89	0.057682	WATER9	9.1735E-06	WATER9	24.34	EPI	30800	EPI
Hexanone, 2-	591-78-6	100.16	EPI	0.0038103	0.0000932	EPI	0.8113	CRC89	0.070356	WATER9	8.4404E-06	WATER9	14.98	EPI	17200	EPI
Hexazinone	51235-04-2	252.32	EPI	9.24E-11	2.26E-12	EPI	1.25	CRC89	0.024566	WATER9	6.2842E-06	WATER9	129.4	EPI	33000	EPI
Hydrazine	302-01-2	32.05	EPI				1.0036	CRC89							1000000	EPI
Hydrazine Sulfate	10034-93-2	128.1	EPI				1.378	CRC89							30550	PERRY
Hydrogen Chloride	7647-01-0	35.45	EPI				1.49	CRC89								
Hydrogen Fluoride	7664-39-3	20.01	EPI				0.818	CRC89								
Hydrogen Sulfide	7783-06-4	34.08	EPI				1.393	CRC89							4370000	PERRY
Hydroquinone	123-31-9	110.11	EPI	1.9338E-09	4.73E-11	EPI	1.33	CRC89	0.079843	WATER9	0.0000107	WATER9	240.5	EPI	72000	EPI
Imazalil	35554-44-0	297.19	EPI	1.0589E-07	2.59E-09	EPI	1.243	CRC89	0.022493	WATER9	5.6772E-06	WATER9	8495	EPI	180	EPI
Imazaquin	81335-37-7	311.34	EPI	2.825E-16	6.91E-18	EPI			0.041362	WATER9	4.8328E-06	WATER9	2386	EPI	90	EPI
Iodine	7553-56-2	253.81	EPI				4.933	CRC89							330	EPI
Iprodione	36734-19-7	330.17	EPI	1.2756E-07	3.12E-09	EPI			0.039774	WATER9	4.6472E-06	WATER9	52.52	EPI	13.9	EPI
Iron	7439-89-6	55.85	EPI				7.87	CRC89								
Isobutyl Alcohol	78-83-1	74.12	EPI	0.0003998	0.00000978	EPI	0.8018	CRC89	0.089671	WATER9	0.00001	WATER9	2.919	EPI	85000	EPI
Isophorone	78-59-1	138.21	EPI	0.0002715	0.00000664	EPI	0.9255	CRC89	0.052505	WATER9	7.5296E-06	WATER9	65.15	EPI	12000	EPI
Isopropalin	33820-53-0	309.37	EPI	0.004538	0.000111	EPI			0.041537	WATER9	4.8533E-06	WATER9	11430	EPI	0.11	EPI
Isopropanol	67-63-0	60.1	EPI	0.0003312	0.0000081	EPI	0.7809	CRC89	0.103223	WATER9	0.0000112	WATER9	1.53	EPI	1000000	EPI
Isopropyl Methyl Phosphonic Acid	1832-54-8	138.1	EPI	2.8128E-07	6.88E-09	EPI			0.071114	WATER9	8.3092E-06	WATER9	7.707	EPI	1000000	EPI
Isoxaben	82558-50-7	332.4	EPI	5.1922E-08	1.27E-09	EPI			0.039596	WATER9	4.6264E-06	WATER9	1262	EPI	1.42	EPI
JP-7	NA															
Kerb	23950-58-5	256.13	EPI	3.9943E-07	9.77E-09	EPI			0.04711	WATER9	5.5044E-06	WATER9	404.9	EPI	15	EPI
Lactofen	77501-63-4	461.78	EPI	0.0000193	0.000000472	EPI			0.031803	WATER9	3.7159E-06	WATER9	23030	EPI	0.1	EPI
Lead Compounds																
~Lead acetate	301-04-2	325.29	EPI				3.25	CRC89	0.033366	WATER9	9.5728E-06	WATER9	1	EPI	1600	EPI
~Lead and Compounds	7439-92-1	207.2	EPI				11.3	CRC89								
~Lead subacetate	1335-32-6	805.7	EPI						0.021943	WATER9	2.5639E-06	WATER9	10.37	EPI	62500	EPI
~Tetraethyl Lead	78-00-2	323.45	EPI	23.221586	0.568	EPI	1.653	CRC89	0.02464	WATER9	6.4025E-06	WATER9	647.9	EPI	0.29	EPI
Linuron	330-55-2	249.1	EPI	2.5552E-07	6.25E-09	EPI			0.047992	WATER9	5.6075E-06	WATER9	339.8	EPI	75	EPI
Lithium	7439-93-2	6.94	EPI				0.534	CRC89								
Londax	83055-99-6	410.4	EPI	1.545E-13	3.78E-15	EPI			0.034405	WATER9	4.0199E-06	WATER9	27.76	EPI	120	EPI
MCPA	94-74-6	200.62	EPI	5.4374E-08	1.33E-09	EPI			0.055442	WATER9	6.4779E-06	WATER9	29.63	EPI	630	EPI
MCPB	94-81-5	228.68	EPI	1.1079E-07	2.71E-09	EPI			0.050808	WATER9	5.9366E-06	WATER9	98.4	EPI	48	EPI
MCPP	93-65-2	214.65	EPI	3.6631E-08	8.96E-10	EPI			0.052999	WATER9	6.1925E-06	WATER9	48.51	EPI	620	EPI
Malathion	121-75-5	330.35	EPI	1.9992E-07	4.89E-09	EPI	1.2076	CRC89	0.020988	WATER9	5.2365E-06	WATER9	31.27	EPI	143	EPI
Maleic Anhydride	108-31-6	98.06	EPI	0.0001607	0.00000393	EPI	1.314	CRC89	0.088395	WATER9	0.0000114	WATER9	1	EPI	163000	PERRY
Maleic Hydrazide	123-33-1	112.09	EPI	1.0834E-09	2.65E-11	EPI			0.081729	WATER9	9.5494E-06	WATER9	3.303	EPI	4510	EPI
Malononitrile	109-77-3	66.06	EPI	5.3557E-06	0.000000131	EPI	1.191	CRC89	0.115073	WATER9	0.0000136	WATER9	3.334	EPI	133000	EPI
Mancozeb	8018-01-7	212.36	EPI	0.0000231	0.000000564	EPI			0.053379	WATER9	6.2369E-06	WATER9	607.6	EPI	1000000	EPI
Maneb	12427-38-2	212.36	EPI	0.0000231	0.000000564	EPI			0.053379	WATER9	6.2369E-06	WATER9	607.6	EPI	1000000	EPI
Manganese (Diet)	7439-96-5	54.94	EPI				7.3	CRC89								
Manganese (Non-diet)	7439-96-5	54.94	EPI				7.3	CRC89								
Mephosfolan	950-10-7	269.32	EPI	4.8651E-09	1.19E-10	EPI			0.045559	WATER9	5.3232E-06	WATER9	636.3	EPI	57	EPI
Mepiquat Chloride	24307-26-4	149.67	EPI	1.762E-10	4.31E-12	EPI			0.067401	WATER9	7.8752E-06	WATER9	66.16	EPI	500000	EPI
Mercury Compounds																
~Mercuric Chloride (and other Mercury salts)	7487-94-7	271.5	EPI				5.6	CRC89							69000	EPI
~Mercury (elemental)	7439-97-6	200.59	EPI	0.467	0.0114228	SSL	13.534	CRC89	0.0307	SSL	0.0000063	SSL			0.06	EPI
~Methyl Mercury	22967-92-6	215.63	EPI													
~Phenylmercuric Acetate	62-38-4	336.74	EPI	2.314E-08	5.66E-10	EPI			0.039255	WATER9	4.5866E-06	WATER9	56.44	EPI	4370	EPI
Merphos	150-50-5	298.5	EPI	0.000928	0.0000227	EPI	1.02	CRC89	0.0204	WATER9	5.0288E-06	WATER9	48970	EPI	0.0009971	EPI
Merphos Oxide	78-48-8	314.5	EPI	0.000012	0.000000294	EPI	1.057	CRC89	0.02019	WATER9	4.979E-06	WATER9	2350	EPI	2.3	EPI

Metalaxyl	57837-19-1	279.34	EPI	1.2061E-07	2.95E-09	EPI			0.044463	WATER9	5.1951E-06	WATER9	38.57	EPI	8400	EPI
Methacrylonitrile	126-98-7	67.09	EPI	0.0100981	0.000247	EPI	0.8001	CRC89	0.096431	WATER9	0.0000106	WATER9	13.05	EPI	25400	EPI
Methamidophos	10265-92-6	141.13	EPI	3.5487E-08	8.68E-10	EPI	1.31	CRC89	0.059623	WATER9	9.1593E-06	WATER9	5.407	EPI	1000000	EPI
Methanol	67-56-1	32.04	EPI	0.000186	0.00000455	EPI	0.7914	CRC89	0.158281	WATER9	0.0000165	WATER9	1	EPI	1000000	EPI
Methidathion	950-37-8	302.32	EPI	2.9313E-07	7.17E-09	EPI			0.04218	WATER9	4.9284E-06	WATER9	21.24	EPI	187	EPI
Methomyl	16752-77-5	162.21	EPI	8.054E-10	1.97E-11	EPI	1.2946	CRC89	0.04759	WATER9	8.3658E-06	WATER9	10	EPI	58000	EPI
Methoxy-5-nitroaniline, 2-	99-59-2	168.15	EPI	6.0098E-07	1.47E-08	EPI	1.2068	CRC89	0.043046	WATER9	7.8494E-06	WATER9	71.31	EPI	115	EPI
Methoxychlor	72-43-5	345.66	EPI	8.2993E-06	0.000000203	EPI	1.41	CRC89	0.022085	WATER9	5.5926E-06	WATER9	26890	EPI	0.1	EPI
Methoxyethanol Acetate, 2-	110-49-6	118.13	EPI	0.0000127	0.000000311	EPI	1.0074	CRC89	0.065835	WATER9	8.7052E-06	WATER9	2.492	EPI	1000000	EPI
Methoxyethanol, 2-	109-86-4	76.1	EPI	0.0000135	0.00000033	EPI	0.9647	CRC89	0.095152	WATER9	0.000011	WATER9	1	EPI	1000000	EPI
Methyl Acetate	79-20-9	74.08	EPI	0.0047016	0.000115	EPI	0.9342	CRC89	0.095776	WATER9	0.000011	WATER9	3.064	EPI	243000	EPI
Methyl Acrylate	96-33-3	86.09	EPI	0.0081357	0.000199	EPI	0.9535	CRC89	0.085998	WATER9	0.0000102	WATER9	5.844	EPI	49400	EPI
Methyl Ethyl Ketone (2-Butanone)	78-93-3	72.11	EPI	0.0023262	0.0000569	EPI	0.7999	CRC89	0.091444	WATER9	0.0000102	WATER9	4.51	EPI	223000	EPI
Methyl Hydrazine	60-34-4	46.07	EPI	1.2919E-06	3.16E-08	EPI	0.866	LANGE	0.129093	WATER9	0.000014	WATER9	13.31	EPI	1000000	EPI
Methyl Isobutyl Ketone (4-methyl-2-pentanone)	108-10-1	100.16	EPI	0.0056419	0.000138	EPI	0.7965	CRC89	0.06978	WATER9	8.3477E-06	WATER9	12.6	EPI	19000	EPI
Methyl Isocyanate	624-83-9	57.05	EPI	0.0378577	0.000926	EPI	0.9588	CRC89	0.116552	WATER9	0.0000131	WATER9	39.6	EPI	48330	EPI
Methyl Methacrylate	80-62-6	100.12	EPI	0.0130417	0.000319	EPI	0.9377	CRC89	0.075045	WATER9	9.2087E-06	WATER9	9.14	EPI	15000	EPI
Methyl Parathion	298-00-0	263.21	EPI	4.0883E-06	0.0000001	EPI	1.358	CRC89	0.024985	WATER9	6.4392E-06	WATER9	729.3	EPI	37.7	EPI
Methyl Phosphonic Acid	993-13-5	96.02	EPI	4.988E-10	1.22E-11	EPI			0.090611	WATER9	0.0000106	WATER9	1.407	EPI	20000	EPI
Methyl Styrene (Mixed Isomers)	25013-15-4	118.18	EPI	0.1042518	0.00255	EPI			0.078897	WATER9	9.2184E-06	WATER9	697.8	EPI	89	EPI
Methyl methanesulfonate	66-27-3	110.13	EPI	0.0001648	0.00000403	EPI	1.2943	CRC89	0.078906	WATER9	0.0000106	WATER9	4.332	EPI	200000	LANGE
Methyl tert-Butyl Ether (MTBE)	1634-04-4	88.15	EPI	0.0239984	0.000587	EPI	0.7353	CRC89	0.075268	WATER9	8.5905E-06	WATER9	11.56	EPI	51000	EPI
Methyl-1,4-benzenediamine dihydrochloride, 2-	615-45-2															
Methyl-5-Nitroaniline, 2-	99-55-8	152.15	EPI	7.9313E-07	1.94E-08	EPI			0.066666	WATER9	7.7894E-06	WATER9	178.6	EPI	613.11	EPI
Methyl-N-nitro-N-nitrosoguanidine, N-	70-25-7	147.09	EPI	4.988E-11	1.22E-12	EPI			0.068187	WATER9	7.967E-06	WATER9	72.02	EPI	1000000	EPI
Methylaniline Hydrochloride, 2-	636-21-5	107.16	EPI	0.0000809	0.00000198	EPI			0.084217	WATER9	9.8401E-06	WATER9	115	EPI	16600	EPI
Methylarsonic acid	124-58-3	139.97	EPI						0.07048	WATER9	8.235E-06	WATER9	43.89	EPI	256000	EPI
Methylbenzene,1-4-diamine monohydrochloride, 2-	74612-12-7															
Methylbenzene-1,4-diamine sulfate, 2-	615-50-9															
Methylcholanthrene, 3-	56-49-5	268.36	EPI	0.0002142	0.00000524	EPI	1.28	CRC89	0.024056	WATER9	6.1428E-06	WATER9	961600	EPI	0.0029	EPI
Methylene Chloride	75-09-2	84.93	EPI	0.13287	0.00325	EPI	1.3266	CRC89	0.099939	WATER9	0.0000125	WATER9	21.73	EPI	13000	EPI
Methylene-bis(2-chloroaniline), 4,4'-	101-14-4	267.16	EPI	4.661E-10	1.14E-11	EPI			0.045804	WATER9	5.3519E-06	WATER9	5698	EPI	13.9	EPI
Methylene-bis(N,N-dimethyl) Aniline, 4,4'-	101-61-1	254.38	EPI	4.9469E-06	0.000000121	EPI			0.047326	WATER9	5.5297E-06	WATER9	2667	EPI	5.4926	EPI
Methylenebisbenzenamine, 4,4'-	101-77-9	198.27	EPI	6.46E-10	1.58E-11	EPI			0.055879	WATER9	6.529E-06	WATER9	2126	EPI	1000	EPI
Methylenediphenyl Diisocyanate	101-68-8	250.26	EPI	0.0000366	0.000000895	EPI	1.197	CRC89	0.024174	WATER9	6.1531E-06	WATER9	284900	EPI	1.836	EPI
Methylstyrene, Alpha-	98-83-9	118.18	EPI	0.1042518	0.00255	EPI	0.9106	CRC89	0.062902	WATER9	8.1911E-06	WATER9	697.8	EPI	116	EPI
Metolachlor	51218-45-2	283.8	EPI	3.6795E-07	0.000000009	EPI	1.12	CRC89	0.021922	WATER9	5.4827E-06	WATER9	488.5	EPI	530	EPI
Metribuzin	21087-64-9	214.29	EPI	4.7833E-09	1.17E-10	EPI	1.31	CRC89	0.02734	WATER9	7.1291E-06	WATER9	53.13	EPI	1050	EPI
Mineral oils	8012-95-1	170.34	EPI	334.42355	8.18	EPI			0.061831	WATER9	7.2245E-06	WATER9	4818	EPI	0.0037	EPI
Mirex	2385-85-5	545.55	EPI	0.0331562	0.000811	EPI			0.028458	WATER9	3.325E-06	WATER9	356600	EPI	0.085	EPI
Molinate	2212-67-1	187.3	EPI	0.0001676	0.0000041	EPI	1.063	CRC89	0.031561	WATER9	6.8182E-06	WATER9	181.9	EPI	970	EPI
Molybdenum	7439-98-7	95.94	EPI				10.2	CRC89								
Monochloramine	10599-90-3	51.48	EPI													
Monomethylaniline	100-61-8	107.16	EPI	0.000363	0.00000888	EPI	0.9891	CRC89	0.0721	WATER9	9.1284E-06	WATER9	82.08	EPI	5620	EPI
N,N'-Diphenyl-1,4-benzenediamine	74-31-7	260.34	EPI	8.381E-09	2.05E-10	EPI			0.046601	WATER9	5.4449E-06	WATER9	51890	EPI	0	PERRY
Naled	300-76-5	380.79	EPI	0.0026615	0.0000651	EPI	1.96	CRC89	0.024567	WATER9	0.00000643	WATER9	126.7	EPI	1.5	EPI
Naphtha, High Flash Aromatic (HFAN)	64724-95-6															
Naphthylamine, 2-	91-59-8	143.19	EPI	3.3115E-06	0.000000081	EPI	1.6414	CRC89	0.064451	WATER9	0.0000104	WATER9	2478	EPI	189	EPI
Napropamide	15299-99-7	271.36	EPI	3.4383E-08	8.41E-10	EPI			0.04533	WATER9	5.2965E-06	WATER9	3218	EPI	73	EPI
Nickel Carbonyl	13463-39-3	170.734	CRC89				1.31	CRC89							180	PERRY
Nickel Oxide	1313-99-1	74.69	EPI				6.72	CRC89								
Nickel Refinery Dust	NA															
Nickel Soluble Salts	7440-02-0	58.69	EPI				8.9	CRC89								
Nickel Subsulfide	12035-72-2	240.21	CRC89				5.87	CRC89								
Nitrate	14797-55-8	62	EPI													
Nitrite	14797-65-0	47.01	EPI													
Nitroaniline, 2-	88-74-4	138.13	EPI	2.4121E-06	0.000000059	EPI	0.9015	CRC89	0.051919	WATER9	7.4144E-06	WATER9	111.3	EPI	1470	EPI
Nitroaniline, 4-	100-01-6	138.13	EPI	5.1513E-08	1.26E-09	EPI	1.424	CRC89	0.06366	WATER9	9.7545E-06	WATER9	109.1	EPI	728	EPI
Nitrobenzene	98-95-3	123.11	EPI	0.0009812	0.000024	EPI	1.2037	CRC89	0.068054	WATER9	9.4495E-06	WATER9	226.4	EPI	2090	EPI

Nitrocellulose	9004-70-0	387.3	EPI	1.345E-21	3.29E-23	EPI			0.035759	WATER9	4.1782E-06	WATER9	10	EPI	1000000	EPI
Nitrofurantoin	67-20-9	238.16	EPI	5.437E-11	1.33E-12	EPI			0.049451	WATER9	5.7779E-06	WATER9	116.8	EPI	79.5	EPI
Nitrofurazone	59-87-0	198.14	EPI	1.267E-11	3.1E-13	EPI			0.055904	WATER9	6.5319E-06	WATER9	349.7	EPI	210	EPI
Nitroglycerin	55-63-0	227.09	EPI	3.5405E-06	8.66E-08	EPI	1.5931	CRC89	0.029015	WATER9	7.7428E-06	WATER9	115.8	EPI	1380	EPI
Nitroguanidine	556-88-7	104.07	EPI	1.836E-10	4.49E-12	EPI			0.085876	WATER9	0.00001	WATER9	20.65	EPI	4400	EPI
Nitromethane	75-52-5	61.04	EPI	0.0011693	0.0000286	EPI	1.1371	CRC89	0.119285	WATER9	0.0000139	WATER9	10.32	EPI	111000	EPI
Nitropropane, 2-	79-46-9	89.09	EPI	0.0048651	0.000119	EPI	0.9821	CRC89	0.084697	WATER9	0.0000102	WATER9	30.8	EPI	17000	EPI
Nitroso-N-ethylurea, N-	759-73-9	117.11	EPI	5.3966E-09	1.32E-10	EPI			0.079376	WATER9	9.2745E-06	WATER9	20.98	EPI	13000	EPI
Nitroso-N-methylurea, N-	684-93-5	103.08	EPI	4.0515E-09	9.91E-11	EPI			0.086425	WATER9	0.0000101	WATER9	11	EPI	14400	EPI
Nitroso-di-N-butylamine, N-	924-16-3	158.25	EPI	0.0005397	0.0000132	EPI			0.064942	WATER9	7.5879E-06	WATER9	914.6	EPI	1270	EPI
Nitroso-di-N-propylamine, N-	621-64-7	130.19	EPI	0.00022	0.00000538	EPI	0.9163	CRC89	0.05644	WATER9	7.758E-06	WATER9	275.4	EPI	13000	EPI
Nitrosodiethanolamine, N-	1116-54-7	134.14	EPI	9.321E-15	2.28E-16	EPI			0.072507	WATER9	8.4719E-06	WATER9	1	EPI	1000000	EPI
Nitrosodiethylamine, N-	55-18-5	102.14	EPI	0.0001484	0.00000363	EPI	0.9422	CRC89	0.073841	WATER9	9.1252E-06	WATER9	82.92	EPI	106000	EPI
Nitrosodimethylamine, N-	62-75-9	74.08	EPI	0.0000744	0.00000182	EPI	1.0048	CRC89	0.09877	WATER9	0.0000115	WATER9	22.79	EPI	1000000	EPI
Nitrosodiphenylamine, N-	86-30-6	198.23	EPI	0.000205	5.0143E-06	SSL			0.055887	WATER9	6.5299E-06	WATER9	2632	EPI	35	EPI
Nitrosomethylethylamine, N-	10595-95-6	88.11	EPI	0.0000589	0.00000144	EPI			0.095956	WATER9	0.0000112	WATER9	43.47	EPI	300000	EPI
Nitrosomorpholine [N-]	59-89-2	116.12	EPI	1.0016E-06	2.45E-08	EPI			0.079827	WATER9	9.3271E-06	WATER9	22.51	EPI	1000000	EPI
Nitrosopiperidine [N-]	100-75-4	114.15	EPI	0.0000345	0.000000844	EPI	1.0631	CRC89	0.06989	WATER9	9.1776E-06	WATER9	167.5	EPI	76500	EPI
Nitrosopyrrolidine, N-	930-55-2	100.12	EPI	1.9992E-06	4.89E-08	EPI	1.085	CRC89	0.079971	WATER9	0.0000101	WATER9	91.91	EPI	1000000	EPI
Nitrotoluene, m-	99-08-1	137.14	EPI	0.0003802	0.0000093	EPI	1.1581	CRC89	0.058686	WATER9	8.6541E-06	WATER9	363.2	EPI	500	EPI
Nitrotoluene, o-	88-72-2	137.14	EPI	0.000511	0.0000125	EPI	1.1611	CRC89	0.058754	WATER9	8.6675E-06	WATER9	370.6	EPI	650	EPI
Nitrotoluene, p-	99-99-0	137.14	EPI	0.0002302	0.00000563	EPI	1.1038	CRC89	0.057443	WATER9	8.4083E-06	WATER9	363.2	EPI	442	EPI
Nonane, n-	111-84-2	128.26	EPI	139.00245	3.4	EPI	0.7192	CRC89	0.051432	WATER9	6.769E-06	WATER9	796	EPI	0.22	EPI
Norflurazon	27314-13-2	303.67	EPI	1.4023E-08	3.43E-10	EPI			0.042055	WATER9	4.9138E-06	WATER9	3118	EPI	33.7	EPI
Nustar	85509-19-9	315.4	EPI	0.0000207	0.000000506	EPI			0.041006	WATER9	4.7912E-06	WATER9	81060	EPI	54	EPI
Octabromodiphenyl Ether	32536-52-0	801.38	EPI	0.0000105	0.000000256	EPI			0.022022	WATER9	2.5731E-06	WATER9	98980	EPI	0.0000743	EPI
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetra (HMX)	2691-41-0	296.16	EPI	3.5446E-08	8.67E-10	EPI			0.042763	WATER9	4.9965E-06	WATER9	531.6	EPI	5	EPI
Octamethylpyrophosphoramide	152-16-9	286.25	EPI	2.58E-15	6.31E-17	EPI	1.09	CRC89	0.02154	WATER9	5.3664E-06	WATER9	20.12	EPI	1000000	EPI
Oryzalin	19044-88-3	346.36	EPI	7.8087E-08	1.91E-09	EPI			0.038524	WATER9	4.5013E-06	WATER9	825.4	EPI	2.5	EPI
Oxadiazon	19666-30-9	345.23	EPI	2.9722E-06	7.27E-08	EPI			0.038608	WATER9	4.5111E-06	WATER9	4996	EPI	0.7	EPI
Oxamyl	23135-22-0	219.26	EPI	9.6893E-09	2.37E-10	EPI	0.97	CRC89	0.02347	WATER9	5.8716E-06	WATER9	10	EPI	280000	EPI
Paclobutrazol	76738-62-0	293.8	EPI	3.3851E-09	8.28E-11	EPI	1.22	CRC89	0.022428	WATER9	5.6527E-06	WATER9	922.9	EPI	26	EPI
Paraquat Dichloride	1910-42-5	257.16	EPI	1.316E-11	3.22E-13	EPI			0.046984	WATER9	5.4897E-06	WATER9	6780	EPI	700000	EPI
Parathion	56-38-2	291.26	EPI	0.0000122	0.000000298	EPI	1.2681	CRC89	0.022949	WATER9	5.8156E-06	WATER9	2422	EPI	11	EPI
Pebulate	1114-71-2	203.35	EPI	0.0096893	0.000237	EPI	0.9458	CRC89	0.024144	WATER9	6.0507E-06	WATER9	299.1	EPI	100	EPI
Pendimethalin	40487-42-1	281.31	EPI	0.000035	0.000000856	EPI	1.19	CRC89	0.022673	WATER9	5.716E-06	WATER9	5615	EPI	0.3	EPI
Pentabromodiphenyl Ether	32534-81-9	564.69	EPI	0.0001447	0.00000354	EPI			0.027811	WATER9	3.2495E-06	WATER9	21660	EPI	0.0000009	EPI
Pentabromodiphenyl ether, 2,2',4,4',5- (BDE-99)	60348-60-9	564.69	EPI	0.0001447	0.00000354	EPI	2.28	IRIS Profile	0.02164	WATER9	5.5584E-06	WATER9	21660	EPI	0.0000009	EPI
Pentachlorobenzene	608-93-5	250.34	EPI	0.0287408	0.000703	EPI	1.8342	CRC89	0.029433	WATER9	7.9473E-06	WATER9	3708	EPI	0.831	EPI
Pentachloroethane	76-01-7	202.3	EPI	0.0793132	0.00194	EPI	1.6796	CRC89	0.031517	WATER9	8.5664E-06	WATER9	136.2	EPI	480	EPI
Pentachloronitrobenzene	82-68-8	295.34	EPI	0.001807	0.0000442	EPI	1.718	CRC89	0.026274	WATER9	6.9198E-06	WATER9	5996	EPI	0.44	EPI
Pentachlorophenol	87-86-5	266.34	EPI	1.0016E-06	2.45E-08	EPI	1.978	CRC89	0.02952	WATER9	8.0121E-06	WATER9	4959	EPI	14	EPI
Pentaerythritol tetranitrate (PETN)	78-11-5	316.14	EPI	4.906E-10	1.2E-11	EPI	1.773	CRC89	0.025756	WATER9	6.7697E-06	WATER9	647.9	EPI	43	EPI
Pentane, n-	109-66-0	72.15	EPI	51.103843	1.25	EPI	0.6262	CRC89	0.08213	WATER9	8.7975E-06	WATER9	72.17	EPI	38	EPI
Perchlorates																
~Ammonium Perchlorate	7790-98-9	117.49	EPI				1.95	CRC89							200000	EPI
~Lithium Perchlorate	7791-03-9	106.392	CRC89				2.428	CRC89							587000	CRC89
~Perchlorate and Perchlorate Salts	14797-73-0	117.49	CRC89												245000	CRC89
~Potassium Perchlorate	7778-74-7	138.55	EPI				2.52	CRC89							15000	EPI
~Sodium Perchlorate	7601-89-0	122.44	EPI				2.52	CRC89							2100000	EPI
Permethrin	52645-53-1	391.3	EPI	0.0000765	0.00000187	EPI	1.23	CRC89	0.019376	WATER9	4.7831E-06	WATER9	118800	EPI	0.006	EPI
Phenacetin	62-44-2	179.22	EPI	8.7081E-09	2.13E-10	EPI			0.059772	WATER9	6.9839E-06	WATER9	40.99	EPI	766	EPI
Phenmedipham	13684-63-4	300.32	EPI	3.438E-11	8.41E-13	EPI			0.042367	WATER9	4.9503E-06	WATER9	2594	EPI	4.7	EPI
Phenol	108-95-2	94.11	EPI	0.0000136	0.000000333	EPI	1.0545	CRC89	0.083401	WATER9	0.0000103	WATER9	187.2	EPI	82800	EPI
Phenothiazine	92-84-2															
Phenylenediamine, m-	108-45-2	108.14	EPI	5.1104E-08	1.25E-09	EPI	1.0096	CRC89	0.072115	WATER9	9.1911E-06	WATER9	33.83	EPI	238000	EPI
Phenylenediamine, o-	95-54-5	108.14	EPI	2.9436E-07	7.2E-09	EPI			0.083707	WATER9	9.7805E-06	WATER9	34.52	EPI	40400	EPI
Phenylenediamine, p-	106-50-3	108.14	EPI	3.6304E-08	8.88E-10	EPI			0.083707	WATER9	9.7805E-06	WATER9	33.83	EPI	37000	EPI
Phenylphenol, 2-	90-43-7	170.21	EPI	0.0000429	0.00000105	EPI	1.213	CRC89	0.042092	WATER9	7.8162E-06	WATER9	6722	EPI	700	EPI

Phorate	298-02-2	260.37	EPI	0.0001787	0.00000437	EPI	1.16	CRC89	0.023327	WATER9	5.8965E-06	WATER9	459.8	EPI	50	EPI
Phosgene	75-44-5	98.92	EPI	0.6827473	0.0167	EPI	1.3719	CRC89	0.089326	WATER9	0.0000117	WATER9	1	EPI	6825.5	YAWS
Phosmet	732-11-6	317.32	EPI	3.426E-07	8.38E-09	EPI			0.04084	WATER9	4.7719E-06	WATER9	10	EPI	24.4	EPI
Phosphates, Inorganic																
~Aluminum metaphosphate	13776-88-0															
~Ammonium polyphosphate	68333-79-9															
~Calcium pyrophosphate	7790-76-3															
~Diammonium phosphate	7783-28-0															
~Dicalcium phosphate	7757-93-9															
~Dimagnesium phosphate	7782-75-4															
~Dipotassium phosphate	7758-11-4															
~Disodium phosphate	7558-79-4															
~Monoaluminum phosphate	13530-50-2															
~Monoammonium phosphate	7722-76-1															
~Monocalcium phosphate	7758-23-8															
~Monomagnesium phosphate	7757-86-0															
~Monopotassium phosphate	7778-77-0															
~Monosodium phosphate	7558-80-7															
~Polyphosphoric acid	8017-16-1															
~Potassium tripolyphosphate	13845-36-8															
~Sodium acid pyrophosphate	7758-16-9															
~Sodium aluminum phosphate (acidic)	7785-88-8															
~Sodium aluminum phosphate (anhydrous)	10279-59-1															
~Sodium aluminum phosphate (tetrahydrate)	10305-76-7															
~Sodium hexametaphosphate	10124-56-8															
~Sodium polyphosphate	68915-31-1															
~Sodium trimetaphosphate	7785-84-4															
~Sodium tripolyphosphate	7758-29-4															
~Tetrapotassium phosphate	7320-34-5															
~Tetrasodium pyrophosphate	7722-88-5															
~Trialuminum sodium tetra decahydrogenoctaorthophosphate (dihydrate)	15136-87-5															
~Tricalcium phosphate	7758-87-4															
~Trimagnesium phosphate	7757-87-1															
~Tripotassium phosphate	7778-53-2															
~Trisodium phosphate	7601-54-9															
Phosphine	7803-51-2	34	EPI				1.39	CRC89							3.3	EPI
Phosphoric Acid	7664-38-2	98	EPI				1.834	PERRY							5480000	CRC89
Phosphorus, White	7723-14-0	30.9738	EPI				2.69	CRC89							3.3	EPI
Phthalic Acid, P-	100-21-0	166.13	EPI	1.586E-11	3.88E-13	EPI	1.51	PERRY	0.048723	WATER9	9.0446E-06	WATER9	79.24	EPI	15	EPI
Phthalic Anhydride	85-44-9	148.12	EPI	6.6639E-07	1.63E-08	EPI	1.527	CRC89	0.05948	WATER9	9.7545E-06	WATER9	10	EPI	6200	EPI
Picloram	1918-02-1	241.46	EPI	2.179E-12	5.33E-14	EPI			0.048999	WATER9	5.7252E-06	WATER9	38.77	EPI	430	EPI
Picramic Acid (2-Amino-4,6-dinitrophenol)	96-91-3	199.12	EPI	7.604E-13	1.86E-14	EPI			0.05572	WATER9	6.5104E-06	WATER9	226.5	EPI	1400	EPI
Pirimiphos, Methyl	29232-93-7	305.33	EPI	0.0000287	0.000000701	EPI	1.17	CRC89	0.021542	WATER9	5.3867E-06	WATER9	374.7	EPI	8.6	EPI
Polybrominated Biphenyls	59536-65-1															
Polychlorinated Biphenyls (PCBs)																
~Aroclor 1016	12674-11-2	257.55	EPI	0.0081766	0.0002	EPI			0.046937	WATER9	5.4842E-06	WATER9	47700	EPI	0.42	EPI
~Aroclor 1221	11104-28-2	188.66	EPI	0.0300899	0.000736	EPI			0.057761	WATER9	6.7489E-06	WATER9	8397	EPI	15	EPI
~Aroclor 1232	11141-16-5	188.66	EPI	0.0300899	0.000736	EPI			0.057761	WATER9	6.7489E-06	WATER9	8397	EPI	1.45	EPI
~Aroclor 1242	53469-21-9	291.99	EPI	0.0077678	0.00019	EPI			0.043169	WATER9	5.044E-06	WATER9	78100	EPI	0.277	EPI
~Aroclor 1248	12672-29-6	291.99	EPI	0.0179886	0.00044	EPI			0.043169	WATER9	5.044E-06	WATER9	76530	EPI	0.1	EPI
~Aroclor 1254	11097-69-1	326.44	EPI	0.0115699	0.000283	EPI			0.040076	WATER9	4.6826E-06	WATER9	130500	EPI	0.043	EPI
~Aroclor 1260	11096-82-5	395.33	EPI	0.0137367	0.000336	EPI			0.035273	WATER9	4.1214E-06	WATER9	349700	EPI	0.0144	EPI
~Heptachlorobiphenyl, 2,3,3',4,4',5,5'- (PCB 189)	39635-31-9	395.33	EPI	0.0056419	0.000138	EPI			0.035273	WATER9	4.1214E-06	WATER9	349700	EPI	0.000753	EPI
~Hexachlorobiphenyl, 2,3',4,4',5,5'- (PCB 167)	52663-72-6	360.88	EPI	0.0066231	0.000162	EPI			0.037484	WATER9	4.3797E-06	WATER9	209300	EPI	0.00223	EPI
~Hexachlorobiphenyl, 2,3,3',4,4',5'- (PCB 157)	69782-90-7	360.88	EPI	0.0066231	0.000162	EPI			0.037484	WATER9	4.3797E-06	WATER9	213600	EPI	0.0016469	EPI
~Hexachlorobiphenyl, 2,3,3',4,4',5- (PCB 156)	38380-08-4	360.88	EPI	0.0058463	0.000143	EPI			0.037484	WATER9	4.3797E-06	WATER9	213600	EPI	0.00533	EPI
~Hexachlorobiphenyl, 3,3',4,4',5,5'- (PCB 169)	32774-16-6	360.88	EPI	0.0066231	0.000162	EPI			0.037484	WATER9	4.3797E-06	WATER9	209300	EPI	0.00051	EPI
~Pentachlorobiphenyl, 2',3,4,4',5- (PCB 123)	65510-44-3	326.44	EPI	0.0077678	0.00019	EPI			0.040076	WATER9	4.6826E-06	WATER9	130500	EPI	0.016	EPI
~Pentachlorobiphenyl, 2,3',4,4',5- (PCB 118)	31508-00-6	326.44	EPI	0.0117743	0.000288	EPI			0.040076	WATER9	4.6826E-06	WATER9	127900	EPI	0.0134	EPI

~Pentachlorobiphenyl, 2,3,3',4,4'- (PCB 105)	32598-14-4	326.44	EPI	0.0115699	0.000283	EPI			0.040076	WATER9	4.6826E-06	WATER9	130500	EPI	0.0034	EPI
~Pentachlorobiphenyl, 2,3,4,4',5- (PCB 114)	74472-37-0	326.44	EPI	0.0077678	0.00019	EPI			0.040076	WATER9	4.6826E-06	WATER9	130500	EPI	0.016	EPI
~Pentachlorobiphenyl, 3,3',4,4',5- (PCB 126)	57465-28-8	326.44	EPI	0.0077678	0.00019	EPI			0.040076	WATER9	4.6826E-06	WATER9	127900	EPI	0.0073282	EPI
~Polychlorinated Biphenyls (high risk)	1336-36-3	291.99	EPI	0.0077678	0.00019	EPI			0.043169	WATER9	5.044E-06	WATER9	78100	EPI	0.7	EPI
~Polychlorinated Biphenyls (low risk)	1336-36-3	291.99	EPI	0.0077678	0.00019	EPI			0.043169	WATER9	5.044E-06	WATER9	78100	EPI	0.7	EPI
~Polychlorinated Biphenyls (lowest risk)	1336-36-3	291.99	EPI	0.0077678	0.00019	EPI			0.043169	WATER9	5.044E-06	WATER9	78100	EPI	0.7	EPI
~Tetrachlorobiphenyl, 3,3',4,4'- (PCB 77)	32598-13-3	291.99	EPI	0.0003843	0.0000094	EPI			0.043169	WATER9	5.044E-06	WATER9	78100	EPI	0.000569	EPI
~Tetrachlorobiphenyl, 3,4,4',5- (PCB 81)	70362-50-4	291.99	EPI	0.0091169	0.000223	EPI			0.043169	WATER9	5.044E-06	WATER9	78100	EPI	0.032245	EPI
Polymeric Methylene Diphenyl Diisocyanate (PMDI)	9016-87-9	512.53	EPI	5.397E-10	1.32E-11	EPI			0.029667	WATER9	3.4664E-06	WATER9	1E+10	EPI	1.763E-06	EPI
Polynuclear Aromatic Hydrocarbons (PAHs)																
~Acenaphthene	83-32-9	154.21	EPI	0.0075225	0.000184	EPI	1.222	CRC89	0.050614	WATER9	0.00000833	WATER9	5027	EPI	3.9	EPI
~Anthracene	120-12-7	178.24	EPI	0.0022731	0.0000556	EPI	1.28	CRC89	0.038973	WATER9	7.8523E-06	WATER9	16360	EPI	0.0434	EPI
~Benz[a]anthracene	56-55-3	228.3	EPI	0.0004906	0.000012	EPI			0.050865	WATER9	5.9431E-06	WATER9	176900	EPI	0.0094	EPI
~Benzo(j)fluoranthene	205-82-3	252.32	EPI	8.2993E-06	0.000000203	EPI			0.047583	WATER9	5.5597E-06	WATER9	599400	EPI	0.0025	EPI
~Benzo[a]pyrene	50-32-8	252.32	EPI	0.0000187	0.000000457	EPI			0.047583	WATER9	5.5597E-06	WATER9	587400	EPI	0.00162	EPI
~Benzo[b]fluoranthene	205-99-2	252.32	EPI	0.0000269	0.000000657	EPI			0.047583	WATER9	5.5597E-06	WATER9	599400	EPI	0.0015	EPI
~Benzo[k]fluoranthene	207-08-9	252.32	EPI	0.0000239	0.000000584	EPI			0.047583	WATER9	5.5597E-06	WATER9	587400	EPI	0.0008	EPI
~Chrysene	218-01-9	228.3	EPI	0.0002138	0.00000523	EPI	1.274	CRC89	0.026114	WATER9	6.7495E-06	WATER9	180500	EPI	0.002	EPI
~Dibenz[a,h]anthracene	53-70-3	278.36	EPI	5.7645E-06	0.000000141	EPI			0.044567	WATER9	5.2073E-06	WATER9	1912000	EPI	0.00249	EPI
~Dibenzo(a,e)pyrene	192-65-4	302.38	EPI	5.7645E-07	1.41E-08	EPI			0.042175	WATER9	4.9278E-06	WATER9	6479000	EPI	0.0000425	EPI
~Dimethylbenz(a)anthracene, 7,12-	57-97-6	256.35	EPI	0.0001537	0.00000376	EPI			0.047083	WATER9	5.5013E-06	WATER9	493600	EPI	0.061	EPI
~Fluoranthene	206-44-0	202.26	EPI	0.0003622	0.00000886	EPI	1.252	CRC89	0.027596	WATER9	7.1827E-06	WATER9	55450	EPI	0.26	EPI
~Fluorene	86-73-7	166.22	EPI	0.003933	0.0000962	EPI	1.203	CRC89	0.043974	WATER9	7.889E-06	WATER9	9160	EPI	1.69	EPI
~Indeno[1,2,3-cd]pyrene	193-39-5	276.34	EPI	0.0000142	0.000000348	EPI			0.044784	WATER9	5.2327E-06	WATER9	1951000	EPI	0.00019	EPI
~Methylnaphthalene, 1-	90-12-0	142.2	EPI	0.0210139	0.000514	EPI	1.0202	CRC89	0.052771	WATER9	7.8477E-06	WATER9	2528	EPI	25.8	EPI
~Methylnaphthalene, 2-	91-57-6	142.2	EPI	0.0211774	0.000518	EPI	1.0058	CRC89	0.052432	WATER9	7.7811E-06	WATER9	2478	EPI	24.6	EPI
~Naphthalene	91-20-3	128.18	EPI	0.0179886	0.00044	EPI	1.0253	CRC89	0.060499	WATER9	8.377E-06	WATER9	1544	EPI	31	EPI
~Nitropyrene, 4-	57835-92-4	247.26	EPI	1.0016E-06	2.45E-08	EPI			0.04823	WATER9	5.6353E-06	WATER9	86110	EPI	0.044505	EPI
~Pyrene	129-00-0	202.26	EPI	0.0004865	0.0000119	EPI	1.271	CRC89	0.027787	WATER9	7.2479E-06	WATER9	54340	EPI	0.135	EPI
Prochloraz	67747-09-5	376.67	EPI	6.7048E-07	1.64E-08	EPI			0.036429	WATER9	4.2564E-06	WATER9	2425	EPI	34	EPI
Profluralin	26399-36-0	347.3	EPI	0.0118561	0.00029	EPI			0.038455	WATER9	4.4931E-06	WATER9	30520	EPI	0.1	EPI
Prometon	1610-18-0	225.3	EPI	3.7163E-08	9.09E-10	EPI			0.051315	WATER9	5.9958E-06	WATER9	137.4	EPI	750	EPI
Prometryn	7287-19-6	241.36	EPI	4.8651E-07	1.19E-08	EPI	1.157	CRC89	0.024246	WATER9	6.1613E-06	WATER9	656.4	EPI	33	EPI
Propachlor	1918-16-7	211.69	EPI	0.0000147	0.00000036	EPI	1.242	CRC89	0.026846	WATER9	6.9554E-06	WATER9	204.5	EPI	580	EPI
Propanil	709-98-8	218.08	EPI	6.991E-08	1.71E-09	EPI	1.25	CRC89	0.026511	WATER9	6.8588E-06	WATER9	175.9	EPI	152	EPI
Propargite	2312-35-8	350.48	EPI	0.0000262	0.00000064	EPI	1.1	CRC89	0.01944	WATER9	4.7787E-06	WATER9	36650	EPI	0.215	EPI
Propargyl Alcohol	107-19-7	56.06	EPI	0.000047	0.00000115	EPI	0.9478	CRC89	0.117395	WATER9	0.0000131	WATER9	1.904	EPI	1000000	EPI
Propazine	139-40-2	229.71	EPI	1.8806E-07	4.6E-09	EPI	1.162	CRC89	0.024935	WATER9	6.3634E-06	WATER9	344.1	EPI	8.6	EPI
Propham	122-42-9	179.22	EPI	7.5225E-06	0.000000184	EPI	1.09	CRC89	0.03575	WATER9	7.1072E-06	WATER9	218.6	EPI	179	EPI
Propiconazole	60207-90-1	342.23	EPI	7.0319E-08	1.72E-09	EPI	1.27	CRC89	0.021111	WATER9	5.284E-06	WATER9	1556	EPI	110	EPI
Propionaldehyde	123-38-6	58.08	EPI	0.0030008	0.0000734	EPI	0.8657	CRC89	0.110378	WATER9	0.0000122	WATER9	1	EPI	306000	EPI
Propyl benzene	103-65-1	120.2	EPI	0.4292723	0.0105	EPI	0.8593	CRC89	0.060156	WATER9	7.831E-06	WATER9	813.1	EPI	52.2	EPI
Propylene	115-07-1	42.08	EPI	8.0130826	0.196	EPI	0.505	CRC89	0.109699	WATER9	0.0000107	WATER9	21.73	EPI	200	EPI
Propylene Glycol	57-55-6	76.1	EPI	5.2739E-07	1.29E-08	EPI	1.0361	CRC89	0.098065	WATER9	0.0000115	WATER9	1	EPI	1000000	EPI
Propylene Glycol Dinitrate	6423-43-4	166.09	EPI	0.0000385	0.000000942	EPI			0.062882	WATER9	7.3472E-06	WATER9	60.7	EPI	3261.9	EPI
Propylene Glycol Monoethyl Ether	1569-02-4	104.15	EPI	1.0016E-06	2.45E-08	EPI			0.085832	WATER9	0.00001	WATER9	1.303	EPI	789970	EPI
Propylene Glycol Monomethyl Ether	107-98-2	90.12	EPI	0.0000376	0.00000092	EPI	0.962	CRC89	0.083147	WATER9	9.9606E-06	WATER9	1	EPI	1000000	EPI
Propylene Oxide	75-56-9	58.08	EPI	0.0028455	0.0000696	EPI	0.831	PERRY	0.108512	WATER9	0.0000119	WATER9	5.194	EPI	590000	EPI
Pursuit	81335-77-5	289.34	EPI	4.252E-15	1.04E-16	EPI			0.043433	WATER9	5.0747E-06	WATER9	339.1	EPI	1400	EPI
Pydrin	51630-58-1	419.91	EPI	1.4105E-06	3.45E-08	EPI	1.15	CRC89	0.018059	WATER9	4.4035E-06	WATER9	317000	EPI	0.024	EPI
Pyridine	110-86-1	79.1	EPI	0.0004497	0.000011	EPI	0.9819	CRC89	0.09309	WATER9	0.0000109	WATER9	71.72	EPI	1000000	EPI
Quinalphos	13593-03-8	298.3	EPI	1.897E-06	4.64E-08	EPI			0.042558	WATER9	4.9726E-06	WATER9	4185	EPI	22	EPI
Quinoline	91-22-5	129.16	EPI	0.0000683	0.00000167	EPI	1.0977	CRC89	0.0618	WATER9	8.6873E-06	WATER9	1544	EPI	6110	EPI
Refractory Ceramic Fibers	NA															
Resmethrin	10453-86-8	338.45	EPI	5.4374E-06	0.000000133	EPI			0.039122	WATER9	4.5711E-06	WATER9	311400	EPI	0.0379	EPI
Ronnel	299-84-3	321.54	EPI	0.0013083	0.000032	EPI	1.44	CRC89	0.023158	WATER9	5.9149E-06	WATER9	4457	EPI	1	EPI
Rotenone	83-79-4	394.43	EPI	4.579E-12	1.12E-13	EPI			0.035327	WATER9	4.1277E-06	WATER9	261100	EPI	0.2	EPI
Safrole	94-59-7	162.19	EPI	0.0003708	0.00000907	EPI	1.1	CRC89	0.044227	WATER9	7.5874E-06	WATER9	207.2	EPI	0	PERRY
Savey	78587-05-0	352.88	EPI	9.6893E-07	2.37E-08	EPI			0.038048	WATER9	4.4456E-06	WATER9	2120	EPI	0.5	EPI

Selenious Acid	7783-00-8	128.97	EPI				3	CRC89							900000	PERRY
Selenium	7782-49-2	78.96	EPI				4.809	CRC89								
Selenium Sulfide	7446-34-6	111.02	EPI													
Sethoxydim	74051-80-2	327.49	EPI	8.831E-10	2.16E-11	EPI	1.043	CRC89	0.019633	WATER9	4.8208E-06	WATER9	4374	EPI	25	EPI
Silica (crystalline, respirable)	7631-86-9	60.08	EPI				2.32	PERRY								
Silver	7440-22-4	107.87	EPI				10.5	CRC89								
Simazine	122-34-9	201.66	EPI	3.8512E-08	9.42E-10	EPI	1.302	CRC89	0.028139	WATER9	7.3666E-06	WATER9	146.5	EPI	6.2	EPI
Sodium Acifluorfen	62476-59-9	383.65	EPI	2.4734E-09	6.05E-11	EPI			0.035986	WATER9	4.2046E-06	WATER9	3880	EPI	250000	EPI
Sodium Azide	26628-22-8	65.01	EPI				1.846	CRC89							408000	CRC89
Sodium Diethyldithiocarbamate	148-18-5	171.25	EPI						0.061612	WATER9	7.1989E-06	WATER9	204.5	EPI	427890	EPI
Sodium Fluoride	7681-49-4	41.99	EPI				2.78	CRC89							42200	EPI
Sodium Fluoroacetate	62-74-8	100.03	EPI	0.0000446	0.00000109	EPI			0.088173	WATER9	0.0000103	WATER9	1.44	EPI	1110000	EPI
Sodium Metavanadate	13718-26-8	121.93	CRC89												210000	CRC89
Stirofos (Tetrachlorovinphos)	961-11-5	365.97	EPI	7.5225E-08	1.84E-09	EPI			0.037136	WATER9	4.339E-06	WATER9	1375	EPI	11	EPI
Strontium, Stable	7440-24-6	87.62	EPI				2.64	CRC89								
Strychnine	57-24-9	334.42	EPI	2.437E-12	5.96E-14	EPI	1.36	CRC89	0.022082	WATER9	5.5824E-06	WATER9	5403	EPI	160	EPI
Styrene	100-42-5	104.15	EPI	0.1124285	0.00275	EPI	0.9016	CRC89	0.071114	WATER9	8.7838E-06	WATER9	446.1	EPI	310	EPI
Sulfonylbis(4-chlorobenzene), 1,1'-	80-07-9	287.16	EPI	5.601E-06	0.000000137	EPI			0.043652	WATER9	5.1004E-06	WATER9	2855	EPI	0.51209	EPI
Sulfuric Acid	7664-93-9	98.07	EPI				1.8302	CRC89							1000000	EPI
Systhane	88671-89-0	288.78	EPI	1.7498E-07	4.28E-09	EPI			0.043489	WATER9	5.0813E-06	WATER9	6075	EPI	142	EPI
TCMTB	21564-17-0	238.34	EPI	2.653E-10	6.49E-12	EPI			0.049426	WATER9	5.775E-06	WATER9	3374	EPI	125	EPI
Tebuthiuron	34014-18-1	228.31	EPI	4.906E-09	1.2E-10	EPI			0.050863	WATER9	5.943E-06	WATER9	42.35	EPI	2500	EPI
Temephos	3383-96-8	466.46	EPI	8.0131E-08	1.96E-09	EPI	1.32	CRC89	0.018295	WATER9	4.4908E-06	WATER9	95060	EPI	0.27	EPI
Terbacil	5902-51-2	216.67	EPI	4.906E-09	1.2E-10	EPI	1.34	CRC89	0.027468	WATER9	7.1789E-06	WATER9	50.1	EPI	710	EPI
Terbufos	13071-79-9	288.42	EPI	0.0009812	0.000024	EPI	1.105	CRC89	0.021596	WATER9	5.3861E-06	WATER9	998.9	EPI	5.07	EPI
Terbutryn	886-50-0	241.36	EPI	8.7899E-07	2.15E-08	EPI	1.115	CRC89	0.023826	WATER9	6.0261E-06	WATER9	607	EPI	25	EPI
Tetrabromodiphenyl ether, 2,2',4,4'- (BDE-47)	5436-43-1	485.8	EPI	0.0003467	0.00000848	EPI			0.030746	WATER9	3.5924E-06	WATER9	13230	EPI	0.054234	EPI
Tetrachlorobenzene, 1,2,4,5-	95-94-3	215.89	EPI	0.0408831	0.001	EPI	1.858	CRC89	0.031896	WATER9	8.7531E-06	WATER9	2220	EPI	0.595	EPI
Tetrachloroethane, 1,1,1,2-	630-20-6	167.85	EPI	0.1022077	0.0025	EPI	1.5406	CRC89	0.048176	WATER9	9.0977E-06	WATER9	86.03	EPI	1070	EPI
Tetrachloroethane, 1,1,2,2-	79-34-5	167.85	EPI	0.0150041	0.000367	EPI	1.5953	CRC89	0.048921	WATER9	9.2902E-06	WATER9	94.94	EPI	2830	EPI
Tetrachloroethylene	127-18-4	165.83	EPI	0.7236304	0.0177	EPI	1.623	CRC89	0.050466	WATER9	9.4551E-06	WATER9	94.94	EPI	206	EPI
Tetrachlorophenol, 2,3,4,6-	58-90-2	231.89	EPI	0.0003614	0.00000884	EPI			0.050338	WATER9	5.8816E-06	WATER9	2969	EPI	23	EPI
Tetrachlorotoluene, p- alpha, alpha, alpha-	5216-25-1	229.92	EPI	0.0078904	0.000193	EPI	1.4463	CRC89	0.027587	WATER9	7.2524E-06	WATER9	1606	EPI	6.1149	EPI
Tetraethyl Dithiopyrophosphate	3689-24-5	322.31	EPI	0.0001819	0.00000445	EPI	1.196	CRC89	0.021162	WATER9	5.2838E-06	WATER9	265.6	EPI	30	EPI
Tetrafluoroethane, 1,1,1,2-	811-97-2	102.03	EPI	2.0441537	0.05	EPI	1.2072	CRC89	0.082307	WATER9	0.0000106	WATER9	86.03	EPI	1089.7	EPI
Tetryl (Trinitrophenylmethylnitramine)	479-45-8	287.15	EPI	1.1079E-07	2.71E-09	EPI	1.57	CRC89	0.025563	WATER9	6.6672E-06	WATER9	4605	EPI	74	EPI
Thallium (Soluble Salts)	7440-28-0	204.38	EPI				11.8	CRC89								
Thiobencarb	28249-77-6	257.78	EPI	0.0000109	0.000000267	EPI	1.16	CRC89	0.02345	WATER9	5.9319E-06	WATER9	1628	EPI	28	EPI
Thiodiglycol	111-48-8	122.18	EPI	1.12E-11	2.74E-13	EPI	1.1793	CRC89	0.068021	WATER9	9.3766E-06	WATER9	1	EPI	1000000	EPI
Thiofanox	39196-18-4	218.32	EPI	3.8389E-07	9.39E-09	EPI			0.052403	WATER9	6.1229E-06	WATER9	72.4	EPI	5200	EPI
Thiophanate, Methyl	23564-05-8	342.39	EPI	4.9469E-08	1.21E-09	EPI			0.038822	WATER9	4.536E-06	WATER9	327.4	EPI	26.6	EPI
Thiram	137-26-8	240.42	EPI	7.4407E-06	0.000000182	EPI	1.29	PERRY	0.025567	WATER9	6.5924E-06	WATER9	611.4	EPI	30	EPI
Tin	7440-31-5	118.69	EPI				7.287	CRC89								
Titanium Tetrachloride	7550-45-0	189.68	EPI				1.73	CRC89								
Toluene	108-88-3	92.14	EPI	0.2714636	0.00664	EPI	0.8623	CRC89	0.077805	WATER9	9.2045E-06	WATER9	233.9	EPI	526	EPI
Toluene-2,5-diamine	95-70-5	122.17	EPI	3.8921E-08	9.52E-10	EPI			0.077169	WATER9	9.0166E-06	WATER9	55.39	EPI	13847	EPI
Toluidine, p-	106-49-0	107.16	EPI	0.0000826	0.00000202	EPI	0.9619	CRC89	0.071219	WATER9	8.977E-06	WATER9	112.7	EPI	6500	EPI
Toxaphene	8001-35-2	413.82	EPI	0.0002453	0.000006	EPI			0.034215	WATER9	3.9977E-06	WATER9	77200	EPI	0.74	SSL
Tralomethrin	66841-25-6	665.02	EPI	1.6108E-08	3.94E-10	EPI			0.024938	WATER9	2.9138E-06	WATER9	191100	EPI	0.08	EPI
Tri-n-butyltin	688-73-3	291.07	EPI	62.142273	1.52	EPI	1.103	CRC89	0.021473	WATER9	5.3508E-06	WATER9	8091	EPI	0.82457	EPI
Triallate	2303-17-5	304.66	EPI	0.0004906	0.000012	EPI	1.273	CRC89	0.022458	WATER9	5.6739E-06	WATER9	1008	EPI	4	EPI
Triasulfuron	82097-50-5	401.83	EPI	1.321E-11	3.23E-13	EPI			0.034892	WATER9	4.0769E-06	WATER9	427.2	EPI	32	EPI
Tribromobenzene, 1,2,4-	615-54-3	314.8	EPI	0.0158626	0.000388	EPI			0.041058	WATER9	4.7973E-06	WATER9	614.3	EPI	4.9	EPI
Tributyl Phosphate	126-73-8	266.32	EPI	0.0000576	0.00000141	EPI	0.9727	CRC89	0.021184	WATER9	5.2338E-06	WATER9	2350	EPI	280	EPI
Tributyltin Compounds	NA															
Tributyltin Oxide	56-35-9	596.12	EPI	0.0000123	0.000000302	EPI	1.17	CRC89	0.015124	WATER9	3.6056E-06	WATER9	25930000	EPI	19.5	EPI
Trichloro-1,2,2-trifluoroethane, 1,1,2-	76-13-1	187.38	EPI	21.504497	0.526	EPI	1.5635	CRC89	0.037566	WATER9	8.592E-06	WATER9	196.8	EPI	170	EPI
Trichloroacetic Acid	76-03-9	163.39	EPI	5.5192E-07	1.35E-08	EPI	1.6126	CRC89	0.051749	WATER9	9.5028E-06	WATER9	3.231	EPI	54600	EPI
Trichloroaniline HCl, 2,4,6-	33663-50-2	232.93	EPI	2.935E-12	7.18E-14	EPI			0.050188	WATER9	5.8641E-06	WATER9	1271	EPI	20.964	EPI

Trichloroaniline, 2,4,6-	634-93-5	196.46	EPI	0.0000548	0.00000134	EPI			0.056222	WATER9	6.5691E-06	WATER9	4440	EPI	40	EPI
Trichlorobenzene, 1,2,3-	87-61-6	181.45	EPI	0.0511038	0.00125	EPI	1.4533	CRC89	0.03953	WATER9	8.3836E-06	WATER9	1383	EPI	18	EPI
Trichlorobenzene, 1,2,4-	120-82-1	181.45	EPI	0.058054	0.00142	EPI	1.459	CRC89	0.039599	WATER9	8.4033E-06	WATER9	1356	EPI	49	EPI
Trichloroethane, 1,1,1-	71-55-6	133.41	EPI	0.7031889	0.0172	EPI	1.339	CRC89	0.064817	WATER9	9.599E-06	WATER9	43.89	EPI	1290	EPI
Trichloroethane, 1,1,2-	79-00-5	133.41	EPI	0.0336877	0.000824	EPI	1.4397	CRC89	0.06689	WATER9	0.00001	WATER9	60.7	EPI	4590	EPI
Trichloroethylene	79-01-6	131.39	EPI	0.4026983	0.00985	EPI	1.4642	CRC89	0.068662	WATER9	0.0000102	WATER9	60.7	EPI	1280	EPI
Trichlorofluoromethane	75-69-4	137.37	EPI	3.9656582	0.097	EPI	1.4879	CRC89	0.065356	WATER9	0.00001	WATER9	43.89	EPI	1100	EPI
Trichlorophenol, 2,4,5-	95-95-4	197.45	EPI	0.0000662	0.00000162	EPI	1.49	PERRY	0.031394	WATER9	8.0893E-06	WATER9	1777	EPI	1200	EPI
Trichlorophenol, 2,4,6-	88-06-2	197.45	EPI	0.0001063	0.0000026	EPI	1.4901	CRC89	0.031395	WATER9	8.0896E-06	WATER9	1777	EPI	800	EPI
Trichlorophenoxyacetic Acid, 2,4,5-	93-76-5	255.49	EPI	1.9052E-06	4.66E-08	EPI			0.047189	WATER9	5.5136E-06	WATER9	107	EPI	278	EPI
Trichlorophenoxypropionic acid, -2,4,5	93-72-1	269.51	EPI	3.704E-07	9.06E-09	EPI			0.045538	WATER9	5.3207E-06	WATER9	175.3	EPI	71	EPI
Trichloropropane, 1,1,2-	598-77-6	147.43	EPI	0.0129599	0.000317	EPI	1.372	CRC89	0.057158	WATER9	9.1735E-06	WATER9	94.94	EPI	1900	EPI
Trichloropropane, 1,2,3-	96-18-4	147.43	EPI	0.0140229	0.000343	EPI	1.3889	CRC89	0.057466	WATER9	9.2411E-06	WATER9	115.8	EPI	1750	EPI
Trichloropropene, 1,2,3-	96-19-5	145.42	EPI	0.7195421	0.0176	EPI	1.412	CRC89	0.059063	WATER9	9.4102E-06	WATER9	115.8	EPI	484.19	EPI
Tridiphane	58138-08-2	320.43	EPI	0.0000168	0.00000041	EPI			0.040576	WATER9	4.7409E-06	WATER9	3447	EPI	1.1696	EPI
Triethylamine	121-44-8	101.19	EPI	0.0060916	0.000149	EPI	0.7275	CRC89	0.066363	WATER9	7.8576E-06	WATER9	50.81	EPI	68600	EPI
Trifluralin	1582-09-8	335.29	EPI	0.004211	0.000103	EPI			0.039368	WATER9	4.5998E-06	WATER9	16390	EPI	0.184	EPI
Trimethyl Phosphate	512-56-1	140.08	EPI	2.9436E-07	7.2E-09	EPI	1.2144	CRC89	0.058255	WATER9	8.7915E-06	WATER9	10.6	EPI	500000	EPI
Trimethylbenzene, 1,2,3-	526-73-8															
Trimethylbenzene, 1,2,4-	95-63-6	120.2	EPI	0.2518397	0.00616	EPI	0.8758	CRC89	0.060675	WATER9	7.9209E-06	WATER9	614.3	EPI	57	EPI
Trimethylbenzene, 1,3,5-	108-67-8	120.2	EPI	0.3585446	0.00877	EPI	0.8615	CRC89	0.060225	WATER9	7.843E-06	WATER9	602.1	EPI	48.2	EPI
Trinitrobenzene, 1,3,5-	99-35-4	213.11	EPI	2.6574E-07	6.5E-09	EPI	1.4775	CRC89	0.028969	WATER9	7.6882E-06	WATER9	1683	EPI	278	EPI
Trinitrotoluene, 2,4,6-	118-96-7	227.13	EPI	8.5037E-07	2.08E-08	EPI	1.654	CRC89	0.029509	WATER9	7.9182E-06	WATER9	2812	EPI	115	EPI
Triphenylphosphine Oxide	791-28-6	278.29	EPI	2.1504E-08	5.26E-10	EPI	1.2124	CRC89	0.023005	WATER9	5.8178E-06	WATER9	1954	EPI	204.51	EPI
Tris(2-chloroethyl)phosphate	115-96-8	285.49	EPI	0.0001345	0.00000329	EPI	1.39	CRC89	0.024218	WATER9	6.2191E-06	WATER9	388.3	EPI	7000	EPI
Tris(2-ethylhexyl)phosphate	78-42-2	434.65	EPI	3.2134E-06	7.86E-08	EPI	0.99	CRC89	0.016451	WATER9	3.9425E-06	WATER9	2468000	EPI	0.6	EPI
Uranium (Soluble Salts)	NA	238.03	CRC89				19.1	CRC89								
Urethane	51-79-6	89.09	EPI	2.6288E-06	6.43E-08	EPI	0.9862	CRC89	0.08485	WATER9	0.0000102	WATER9	12.13	EPI	480000	EPI
Vanadium Pentoxide	1314-62-1	181.88	EPI				3.35	CRC89							700	CRC89
Vanadium Sulfate	36907-42-3	273.111	CRC89													
Vanadium and Compounds	NA	50.94	CRC89				6	CRC89							0	CRC89
Vernolate	1929-77-7	203.35	EPI	0.0012633	0.0000309	EPI	0.952	CRC89	0.024219	WATER9	6.0745E-06	WATER9	299.1	EPI	90	EPI
Vinclozolin	50471-44-8	286.12	EPI	7.1137E-07	1.74E-08	EPI	1.51	CRC89	0.025149	WATER9	6.5272E-06	WATER9	283.6	EPI	2.6	EPI
Vinyl Acetate	108-05-4	86.09	EPI	0.0208913	0.000511	EPI	0.9256	CRC89	0.084902	WATER9	0.00001	WATER9	5.583	EPI	20000	EPI
Vinyl Bromide	593-60-2	106.95	EPI	0.5028618	0.0123	EPI	1.4933	CRC89	0.086224	WATER9	0.0000117	WATER9	21.73	EPI	0	LANGE
Vinyl Chloride	75-01-4	62.5	EPI	1.1365495	0.0278	EPI	0.9106	CRC89	0.107119	WATER9	0.000012	WATER9	21.73	EPI	8800	EPI
Warfarin	81-81-2	308.34	EPI	1.1325E-07	2.77E-09	EPI			0.041629	WATER9	4.8641E-06	WATER9	426.1	EPI	17	EPI
Xylene, P-	106-42-3	106.17	EPI	0.2820932	0.0069	EPI	0.8565	CRC89	0.068249	WATER9	8.4199E-06	WATER9	375.3	EPI	162	EPI
Xylene, m-	108-38-3	106.17	EPI	0.2935405	0.00718	EPI	0.8598	CRC89	0.068366	WATER9	8.4394E-06	WATER9	375.3	EPI	161	EPI
Xylene, o-	95-47-6	106.17	EPI	0.2117743	0.00518	EPI	0.8755	CRC89	0.06892	WATER9	8.5315E-06	WATER9	382.9	EPI	178	EPI
Xylenes	1330-20-7	106.17	EPI	0.2117743	0.00518	EPI			0.08474	WATER9	9.9011E-06	WATER9	382.9	EPI	106	EPI
Zinc Phosphide	1314-84-7	258.175	CRC89				4.55	CRC89								
Zinc and Compounds	7440-66-6	65.38	EPI				7.134	CRC89								
Zineb	12122-67-7	275.74	EPI	6.5004E-09	1.59E-10	EPI			0.044849	WATER9	5.2403E-06	WATER9	1345	EPI	10	EPI

Appendix F

TABLE 9.1.RME

Summary of Receptor Risks and Hazards for COPCs

Reasonable Maximum Exposure

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil*										
			Aluminum	N/A	N/A	N/A	N/A	Neurotoxicity	2E-02	N/A	9E-05	2E-02
			Arsenic	N/A	N/A	N/A	N/A	Skin, Vascular	3E-02	N/A	4E-03	3E-02
			Chromium	N/A	N/A	N/A	N/A	Not identified	1E-02	N/A	2E-03	1E-02
			Iron	N/A	N/A	N/A	N/A	GI System	4E-02	N/A	1E-04	4E-02
			Vanadium	N/A	N/A	N/A	N/A	Hair	1E-02	N/A	4E-05	1E-02
			Chemical Total	N/A	N/A	N/A	N/A		1E-01	N/A	6E-03	1E-01
		Exposure Point Total					N/A					1E-01
	Exposure Medium Total						N/A					1E-01
	Air	Emissions from Soil*	Chromium	N/A	N/A	N/A	N/A	Respiratory System	N/A	2E-04	N/A	2E-04
			Chemical Total	N/A	N/A	N/A	N/A		N/A	2E-04	N/A	2E-04
		Exposure Point Total					N/A					2E-04
	Exposure Medium Total						N/A					2E-04
Soil* Total							N/A					1E-01
Groundwater	Groundwater	Tap Water										
			1,1,2,2-Tetrachloroethane	N/A	N/A	N/A	N/A	Liver	1E-01	N/A	1E-02	1E-01
			1,1,2-Trichloroethane	N/A	N/A	N/A	N/A	Blood	2E-02	N/A	2E-03	2E-02
			1,2-Dichloroethane	N/A	N/A	N/A	N/A	Kidney	2E-03	N/A	1E-04	3E-03
			Benzene	N/A	N/A	N/A	N/A	Blood, Immune	9E-03	N/A	1E-03	1E-02
			Chloroform	N/A	N/A	N/A	N/A	Liver, Blood	1E-03	N/A	1E-04	1E-03
			cis-1,2-Dichloroethene	N/A	N/A	N/A	N/A	Kidney	2E+00	N/A	1E-01	2E+00
			Tetrachloroethene	N/A	N/A	N/A	N/A	Liver	3E-03	N/A	2E-03	4E-03
			trans-1,2-Dichloroethene	N/A	N/A	N/A	N/A	Blood	7E-02	N/A	6E-03	8E-02
			Trichloroethene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Vinyl chloride	N/A	N/A	N/A	N/A	Liver	9E-02	N/A	5E-03	1E-01

Scenario Timeframe:	Future
Receptor Population:	Resident
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
			Chemical Total	N/A	N/A	N/A	N/A		2E+00	N/A	2E-01	2E+00
		Exposure Point Total					N/A					2E+00
	Exposure Medium Total						N/A					2E+00
Groundwater	Air	Water Vapors at Showerhead	1,1,2,2-Tetrachloroethane	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			1,1,2-Trichloroethane	N/A	N/A	N/A	N/A	Liver	N/A	8E-01	N/A	8E-01
			1,2-Dichloroethane	N/A	N/A	N/A	N/A	Neurological	N/A	6E-03	N/A	6E-03
			Benzene	N/A	N/A	N/A	N/A	Blood, Immune	N/A	4E-03	N/A	4E-03
			Chloroform	N/A	N/A	N/A	N/A	Liver	N/A	3E-04	N/A	3E-04
			cis-1,2-Dichloroethene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Tetrachloroethene	N/A	N/A	N/A	N/A	Neurological	N/A	3E-04	N/A	3E-04
			trans-1,2-Dichloroethene	N/A	N/A	N/A	N/A	Lung, Liver	N/A	8E-02	N/A	8E-02
			Trichloroethene	N/A	N/A	N/A	N/A	N/A	N/A	9E-01	N/A	9E-01
			Vinyl chloride	N/A	N/A	N/A	N/A	Liver	N/A	1E-02	N/A	1E-02
			Chemical Total	N/A	N/A	N/A	N/A		N/A	2E+00	N/A	2E+00
		Exposure Point Total					N/A					2E+00
	Exposure Medium Total						N/A					2E+00
Groundwater Total							N/A					4E+00
Receptor Total							N/A				Receptor HI Total	4E+00

HI = Hazard Index

N/A = Not available/not applicable

GI = Gastrointestinal

Total Neurotoxicity(Neurological) HI Across All Media =	3E-02
Total Skin HI Across All Media=	3E-02
Total Vascular HI Across All Media =	3E-02
Total GI System HI Across All Media =	4E-02
Total Hair HI Across All Media =	1E-02
Total Respiratory System HI Across All Media =	2E-04
Total Liver HI Across All Media =	1E+00
Total Blood HI Across All Media =	1E-01
Total Kidney HI Across All Media =	2E+00
Total Immune HI Across All Media =	1E-02
Total Lung HI Across All Media =	8E-02

Appendix F
TABLE 9.2.RME
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil*										
			Aluminum	N/A	N/A	N/A	N/A	Neurotoxicity	2E-01	N/A	6E-04	2E-01
			Arsenic	N/A	N/A	N/A	N/A	Skin, Vascular	3E-01	N/A	2E-02	3E-01
			Chromium	N/A	N/A	N/A	N/A	Not identified	1E-01	N/A	1E-02	1E-01
			Iron	N/A	N/A	N/A	N/A	GI System	3E-01	N/A	9E-04	3E-01
			Vanadium	N/A	N/A	N/A	N/A	Hair	1E-01	N/A	3E-04	1E-01
			Chemical Total	N/A	N/A	N/A	N/A		1E+00	N/A	4E-02	1E+00
		Exposure Point Total					N/A					1E+00
	Exposure Medium Total						N/A					1E+00
	Air	Emissions from Soil*	Chromium	N/A	N/A	N/A	N/A	Respiratory System	N/A	2E-04	N/A	2E-04
			Chemical Total	N/A	N/A	N/A	N/A		N/A	2E-04	N/A	2E-04
		Exposure Point Total					N/A					2E-04
	Exposure Medium Total						N/A					2E-04
Soil* Total							N/A					1E+00
Groundwater	Groundwater	Tap Water										
			1,1,2,2-Tetrachloroethane	N/A	N/A	N/A	N/A	Liver	3E-01	N/A	3E-02	3E-01
			1,1,2-Trichloroethane	N/A	N/A	N/A	N/A	Blood	4E-02	N/A	4E-03	4E-02
			1,2-Dichloroethane	N/A	N/A	N/A	N/A	Kidney	6E-03	N/A	3E-04	6E-03
			Benzene	N/A	N/A	N/A	N/A	Blood, Immune	2E-02	N/A	3E-03	2E-02
			Chloroform	N/A	N/A	N/A	N/A	Liver, Blood	2E-03	N/A	2E-04	3E-03
			cis-1,2-Dichloroethene	N/A	N/A	N/A	N/A	Kidney	4E+00	N/A	3E-01	4E+00
			Tetrachloroethene	N/A	N/A	N/A	N/A	Liver	6E-03	N/A	3E-03	9E-03
			trans-1,2-Dichloroethene	N/A	N/A	N/A	N/A	Blood	2E-01	N/A	1E-02	2E-01
			Trichloroethene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Vinyl chloride	N/A	N/A	N/A	N/A	Liver	2E-01	N/A	1E-02	2E-01

Appendix F

TABLE 9.2.RME

Summary of Receptor Risks and Hazards for COPCs

Reasonable Maximum Exposure

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
			Chemical Total	N/A	N/A	N/A	N/A		4E+00	N/A	4E-01	5E+00
		Exposure Point Total					N/A					5E+00
	Exposure Medium Total						N/A					5E+00
Groundwater	Air	Water Vapors at Showerhead	1,1,2,2-Tetrachloroethane	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			1,1,2-Trichloroethane	N/A	N/A	N/A	N/A	Liver	N/A	1E+00	N/A	1E+00
			1,2-Dichloroethane	N/A	N/A	N/A	N/A	Neurological	N/A	1E-02	N/A	1E-02
			Benzene	N/A	N/A	N/A	N/A	Blood, Immune	N/A	7E-03	N/A	7E-03
			Chloroform	N/A	N/A	N/A	N/A	Liver	N/A	5E-04	N/A	5E-04
			cis-1,2-Dichloroethene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Tetrachloroethene	N/A	N/A	N/A	N/A	Neurological	N/A	4E-04	N/A	4E-04
			trans-1,2-Dichloroethene	N/A	N/A	N/A	N/A	Lung, Liver	N/A	1E-01	N/A	1E-01
			Trichloroethene	N/A	N/A	N/A	N/A	N/A	N/A	1E+00	N/A	1E+00
			Vinyl chloride	N/A	N/A	N/A	N/A	Liver	N/A	2E-02	N/A	2E-02
			Chemical Total	N/A	N/A	N/A	N/A		N/A	3E+00	N/A	3E+00
		Exposure Point Total					N/A					3E+00
	Exposure Medium Total						N/A					3E+00
Groundwater Total							N/A					8E+00
Receptor Total							N/A				Receptor HI Total	9E+00

HI = Hazard Index

N/A = Not available/not applicable

GI = Gastrointestinal

Total Neurotoxicity(Neurological) HI Across All Media =	2E-01
Total Skin HI Across All Media=	3E-01
Total Vascular HI Across All Media =	3E-01
Total GI System HI Across All Media =	3E-01
Total Hair HI Across All Media =	1E-01
Total Respiratory System HI Across All Media =	2E-04
Total Liver HI Across All Media =	2E+00
Total Blood HI Across All Media =	3E-01
Total Kidney HI Across All Media =	4E+00
Total Immune HI Across All Media =	3E-02
Total Lung HI Across All Media =	1E-01

Appendix F

TABLE 9.3.RME

Summary of Receptor Risks and Hazards for COPCs

Reasonable Maximum Exposure

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil*										
			Aluminum	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Arsenic	2E-05	N/A	2E-06	2E-05		N/A	N/A	N/A	N/A
			Chromium	9E-05	N/A	1E-05	1E-04		N/A	N/A	N/A	N/A
			Iron	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Vanadium	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Chemical Total	1E-04	N/A	1E-05	1E-04		N/A	N/A	N/A	N/A
		Exposure Point Total					1E-04					N/A
	Exposure Medium Total						1E-04					N/A
	Air	Emissions from Soil*	Chromium	N/A	2E-06	N/A	2E-06		N/A	N/A	N/A	N/A
			Chemical Total	N/A	2E-06	N/A	2E-06		N/A	N/A	N/A	N/A
		Exposure Point Total					2E-06					N/A
	Exposure Medium Total						2E-06					N/A
Soil* Total							1E-04					N/A
Groundwater	Groundwater	Tap Water										
			1,1,2,2-Tetrachloroethane	2E-04	N/A	3E-05	3E-04		N/A	N/A	N/A	N/A
			1,1,2-Trichloroethane	2E-06	N/A	2E-07	2E-06		N/A	N/A	N/A	N/A
			1,2-Dichloroethane	7E-07	N/A	4E-08	8E-07		N/A	N/A	N/A	N/A
			Benzene	1E-06	N/A	2E-07	1E-06		N/A	N/A	N/A	N/A
			Chloroform	2E-07	N/A	2E-08	2E-07		N/A	N/A	N/A	N/A
			cis-1,2-Dichloroethene	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Tetrachloroethene	7E-06	N/A	4E-06	1E-05		N/A	N/A	N/A	N/A
			trans-1,2-Dichloroethene	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Trichloroethene	1E-05	N/A	2E-06	1E-05		N/A	N/A	N/A	N/A
			Vinyl chloride	2E-04	N/A	8E-06	2E-04		N/A	N/A	N/A	N/A
			Chemical Total	4E-04	N/A	4E-05	5E-04		N/A	N/A	N/A	N/A
		Exposure Point Total					5E-04					N/A
	Exposure Medium Total						5E-04					N/A

Appendix F

TABLE 9.3.RME

Summary of Receptor Risks and Hazards for COPCs

Reasonable Maximum Exposure

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Air	Water Vapors at Showerhead	1,1,2,2-Tetrachloroethane	N/A	1E-04	N/A	1E-04		N/A	N/A	N/A	N/A
			1,1,2-Trichloroethane	N/A	1E-06	N/A	1E-06		N/A	N/A	N/A	N/A
			1,2-Dichloroethane	N/A	5E-07	N/A	5E-07		N/A	N/A	N/A	N/A
			Benzene	N/A	5E-07	N/A	5E-07		N/A	N/A	N/A	N/A
			Chloroform	N/A	4E-07	N/A	4E-07		N/A	N/A	N/A	N/A
			cis-1,2-Dichloroethene	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Tetrachloroethene	N/A	2E-07	N/A	2E-07		N/A	N/A	N/A	N/A
			trans-1,2-Dichloroethene	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Trichloroethene	N/A	9E-06	N/A	9E-06		N/A	N/A	N/A	N/A
			Vinyl chloride	N/A	3E-06	N/A	3E-06		N/A	N/A	N/A	N/A
			Chemical Total	N/A	1E-04	N/A	1E-04		N/A	N/A	N/A	N/A
		Exposure Point Total					1E-04					N/A
	Exposure Medium Total						1E-04					N/A
Groundwater Total							6E-04					N/A
Receptor Total							7E-04				Receptor HI Total	N/A

HI = Hazard Index

N/A = Not available/not applicable

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TABLE 9.4.RME

Summary of Receptor Risks and Hazards for COPCs

Reasonable Maximum Exposure

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil*	Aluminum	N/A	N/A	N/A	N/A	Neurotoxicity	5E-02	N/A	1E-04	6E-02
			Arsenic	5E-07	N/A	3E-08	5E-07	Skin, Vascular	7E-02	N/A	4E-03	8E-02
			Chromium	6E-07	N/A	5E-08	7E-07	Not identified	4E-03	N/A	4E-04	5E-03
			Iron	N/A	N/A	N/A	N/A	GI System	8E-02	N/A	2E-04	9E-02
			Vanadium	N/A	N/A	N/A	N/A	Lifetime	2E-02	N/A	4E-05	2E-02
			Chemical Total	1E-06	N/A	8E-08	1E-06		2E-01	N/A	5E-03	2E-01
		Exposure Point Total					1E-06					2E-01
	Exposure Medium Total						1E-06					2E-01
	Air	Emissions from Soil*	Chromium	N/A	6E-09	N/A	6E-09	Respiratory System	N/A	5E-05	N/A	5E-05
			Chemical Total	N/A	6E-09	N/A	6E-09		N/A	5E-05	N/A	5E-05
		Exposure Point Total					6E-09					5E-05
	Exposure Medium Total						6E-09					5E-05
Soil* Total							1E-06					2E-01
Groundwater	Groundwater	Tap Water	1,1,2,2-Tetrachloroethane	N/A	N/A	3E-07	3E-07	Liver	N/A	N/A	4E-03	4E-03
			1,1,2-Trichloroethane	N/A	N/A	2E-09	2E-09	Liver, Immune System	N/A	N/A	6E-04	6E-04
			1,2-Dichloroethane	N/A	N/A	4E-10	4E-10	Kidney	N/A	N/A	1E-05	1E-05
			Benzene	N/A	N/A	2E-09	2E-09	Blood, Immune	N/A	N/A	2E-04	2E-04
			Chloroform	N/A	N/A	2E-10	2E-10	Liver	N/A	N/A	4E-05	4E-05
			cis-1,2-Dichloroethene	N/A	N/A	N/A	N/A	Kidney	N/A	N/A	6E-03	6E-03
			Tetrachloroethene	N/A	N/A	4E-08	4E-08	Liver	N/A	N/A	5E-05	5E-05
			trans-1,2-Dichloroethene	N/A	N/A	N/A	N/A	Blood	N/A	N/A	3E-04	3E-04
			Trichloroethene	N/A	N/A	2E-08	2E-08	N/A	N/A	N/A	N/A	N/A
			Vinyl chloride	N/A	N/A	7E-08	7E-08	Liver	N/A	N/A	2E-03	2E-03
			Chemical Total	N/A	N/A	4E-07	4E-07		N/A	N/A	1E-02	1E-02
		Exposure Point Total					4E-07					1E-02
	Exposure Medium Total						4E-07					1E-02

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TABLE 9.4.RME
Summary of Receptor Risks and Hazards for COPCs
Reasonable Maximum Exposure
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Air	Water Vapors at Showerhead	1,1,2,2-Tetrachloroethane	N/A	2E-10	N/A	2E-10	N/A	N/A	N/A	N/A	N/A
			1,1,2-Trichloroethane	N/A	2E-12	N/A	2E-12	Liver, Respiratory	N/A	4E-06	N/A	4E-06
			1,2-Dichloroethane	N/A	7E-13	N/A	7E-13	Neurological	N/A	3E-08	N/A	3E-08
			Benzene	N/A	9E-13	N/A	9E-13	Blood, Immune	N/A	1E-07	N/A	1E-07
			Chloroform	N/A	6E-13	N/A	6E-13	Liver	N/A	2E-08	N/A	2E-08
			cis-1,2-Dichloroethene	N/A	N/A	N/A	N/A	Kidney	N/A	N/A	N/A	N/A
			Tetrachloroethene	N/A	7E-13	N/A	7E-13	Neurological	N/A	3E-08	N/A	3E-08
			trans-1,2-Dichloroethene	N/A	N/A	N/A	N/A	Lung, Liver	N/A	5E-06	N/A	5E-06
			Trichloroethene	N/A	2E-11	N/A	2E-11	N/A	N/A	8E-05	N/A	8E-05
			Vinyl chloride	N/A	2E-11	N/A	2E-11	Liver	N/A	3E-06	N/A	3E-06
			Chemical Total	N/A	2E-10	N/A	2E-10		N/A	9E-05	N/A	9E-05
		Exposure Point Total					2E-10					9E-05
	Exposure Medium Total						2E-10					9E-05
Groundwater Total							4E-07					1E-02
Receptor Total							2E-06				Receptor HI Total	3E-01

HI = Hazard Index
N/A = Not available/not applicable
GI = Gastrointestinal

Total Neurotoxicity(Neurological) HI Across All Media =	6E-02
Total Skin HI Across All Media=	8E-02
Total Vascular HI Across All Media =	8E-02
Total GI System HI Across All Media =	9E-02
Total Lifetime HI Across All Media =	2E-02
Total Respiratory System HI Across All Media =	5E-05
Total Liver HI Across All Media =	7E-03
Total Blood HI Across All Media =	5E-04
Total Kidney HI Across All Media =	6E-03
Total Immune HI Across All Media =	8E-04
Total Lung HI Across All Media =	5E-06

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TABLE 9.5.RME

Summary of Receptor Risks and Hazards for COPCs

Reasonable Maximum Exposure

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil*										
			Aluminum	N/A	N/A	N/A	N/A	Neurotoxicity	2E-02	N/A	1E-04	2E-02
			Arsenic	4E-06	N/A	7E-07	4E-06	Skin, Vascular	2E-02	N/A	4E-03	3E-02
			Chromium	5E-06	N/A	1E-06	6E-06	Not identified	9E-03	N/A	2E-03	1E-02
			Iron	N/A	N/A	N/A	N/A	GI System	3E-02	N/A	2E-04	3E-02
			Vanadium	N/A	N/A	N/A	N/A	Hair	8E-03	N/A	5E-05	8E-03
			Chemical Total	8E-06	N/A	2E-06	1E-05		8E-02	N/A	7E-03	9E-02
		Exposure Point Total					1E-05					9E-02
	Exposure Medium Total						1E-05					9E-02
	Air	Emissions from Soil*	Chromium	N/A	1E-07	N/A	1E-07	Respiratory System	N/A	5E-05	N/A	5E-05
			Chemical Total	N/A	1E-07	N/A	1E-07		N/A	5E-05	N/A	5E-05
		Exposure Point Total					1E-07					5E-05
	Exposure Medium Total						1E-07					5E-05
Soil* Total							1E-05					9E-02
Groundwater	Groundwater	Tap Water										
			1,1,2,2-Tetrachloroethane	5E-05	N/A	N/A	5E-05	Liver	4E-02	N/A	N/A	4E-02
			1,1,2-Trichloroethane	5E-07	N/A	N/A	5E-07	Blood	6E-03	N/A	N/A	6E-03
			1,2-Dichloroethane	2E-07	N/A	N/A	2E-07	Kidney	9E-04	N/A	N/A	9E-04
			Benzene	2E-07	N/A	N/A	2E-07	Blood, Immune	3E-03	N/A	N/A	3E-03
			Chloroform	4E-08	N/A	N/A	4E-08	Liver, Blood	4E-04	N/A	N/A	4E-04
			cis-1,2-Dichloroethene	N/A	N/A	N/A	N/A	Kidney	6E-01	N/A	N/A	6E-01
			Tetrachloroethene	2E-06	N/A	N/A	2E-06	Liver	9E-04	N/A	N/A	9E-04

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TABLE 9.5.RME

Summary of Receptor Risks and Hazards for COPCs

Reasonable Maximum Exposure

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
			trans-1,2-Dichloroethene	N/A	N/A	N/A	N/A	Blood	3E-02	N/A	N/A	3E-02
			Trichloroethene	2E-06	N/A	N/A	2E-06	N/A	N/A	N/A	N/A	N/A
			Vinyl chloride	3E-05	N/A	N/A	3E-05	Liver	3E-02	N/A	N/A	3E-02
			Chemical Total	9E-05	N/A	N/A	9E-05		7E-01	N/A	N/A	7E-01
		Exposure Point Total					9E-05					7E-01
	Exposure Medium Total						9E-05					7E-01
Groundwater Total							9E-05					7E-01
Receptor Total							1E-04				Receptor HI Total	8E-01

HI = Hazard Index

N/A = Not available/not applicable

GI = Gastrointestinal

Total Neurotoxicity(Neurological) HI Across All Media =	2E-02
Total Skin HI Across All Media=	3E-02
Total Vascular HI Across All Media =	3E-02
Total GI System HI Across All Media =	3E-02
Total Hair HI Across All Media =	8E-03
Total Respiratory System HI Across All Media =	5E-05
Total Liver HI Across All Media =	7E-02
Total Blood HI Across All Media =	4E-02
Total Kidney HI Across All Media =	6E-01
Total Immune HI Across All Media =	3E-03

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TABLE 9.6.RME

Summary of Receptor Risks and Hazards for COPCs

Reasonable Maximum Exposure

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Receptor Population: Site Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil*	Aluminum	N/A	N/A	N/A	N/A	Neurotoxicity	3E-03	N/A	2E-05	3E-03
			Arsenic	7E-07	N/A	1E-07	9E-07	Skin, Vascular	5E-03	N/A	9E-04	6E-03
			Chromium	1E-06	N/A	3E-07	1E-06	Not identified	2E-03	N/A	5E-04	2E-03
			Iron	N/A	N/A	N/A	N/A	GI System	5E-03	N/A	4E-05	5E-03
			Vanadium	N/A	N/A	N/A	N/A	Hair	2E-03	N/A	1E-05	2E-03
			Chemical Total	2E-06	N/A	4E-07	2E-06		2E-02	N/A	1E-03	2E-02
		Exposure Point Total					2E-06					2E-02
	Exposure Medium Total						2E-06					2E-02
	Air	Emissions from Soil*	Chromium	N/A	3E-08	N/A	3E-08	Respiratory System	N/A	1E-05	N/A	1E-05
			Chemical Total	N/A	3E-08	N/A	3E-08		N/A	1E-05	N/A	1E-05
		Exposure Point Total					3E-08					1E-05
	Exposure Medium Total						3E-08					1E-05
Soil* Total							2E-06					2E-02
Receptor Total							2E-06				Receptor HI Total	2E-02

HI = Hazard Index

N/A = Not available/not applicable

GI = Gastrointestinal

Total Neurotoxicity(Neurological) HI Across All Media =	3E-03
Total Skin HI Across All Media=	6E-03
Total Vascular HI Across All Media =	6E-03
Total GI System HI Across All Media =	5E-03
Total Hair HI Across All Media =	2E-03
Total Respiratory System HI Across All Media =	1E-05

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TABLE 9.7.RME

Summary of Receptor Risks and Hazards for COPCs

Reasonable Maximum Exposure

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil*	Aluminum	N/A	N/A	N/A	N/A	Neurotoxicity	3E-03	N/A	1E-05	3E-03
			Arsenic	7E-07	N/A	9E-08	8E-07	Skin, Vascular	5E-03	N/A	6E-04	5E-03
			Chromium	1E-06	N/A	2E-07	1E-06	Not identified	2E-03	N/A	3E-04	2E-03
			Iron	N/A	N/A	N/A	N/A	GI System	5E-03	N/A	2E-05	5E-03
			Vanadium	N/A	N/A	N/A	N/A	Hair	2E-03	N/A	7E-06	2E-03
			Chemical Total	2E-06	N/A	2E-07	2E-06		2E-02	N/A	9E-04	2E-02
		Exposure Point Total					2E-06					2E-02
	Exposure Medium Total						2E-06					2E-02
	Air	Emissions from Soil*	Chromium	N/A	7E-09	N/A	7E-09	Respiratory System	N/A	3E-06	N/A	3E-06
			Chemical Total	N/A	7E-09	N/A	7E-09		N/A	3E-06	N/A	3E-06
		Exposure Point Total					7E-09					3E-06
	Exposure Medium Total						7E-09					3E-06
Soil* Total							2E-06					2E-02
Receptor Total							2E-06				Receptor HI Total	2E-02

HI = Hazard Index
N/A = Not available/not applicable
GI = Gastrointestinal

Total Neurotoxicity(Neurological) HI Across All Media =	3E-03
Total Skin HI Across All Media=	5E-03
Total Vascular HI Across All Media =	5E-03
Total GI System HI Across All Media =	5E-03
Total Hair HI Across All Media =	2E-03
Total Respiratory System HI Across All Media =	3E-06

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TABLE 9.8.RME

Summary of Receptor Risks and Hazards for COPCs

Reasonable Maximum Exposure

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Receptor Population: Trespasser/Visitor
Receptor Age: Youth

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil*	Aluminum	N/A	N/A	N/A	N/A	Neurotoxicity	5E-03	N/A	9E-06	5E-03
			Arsenic	5E-07	N/A	2E-08	5E-07	Skin, Vascular	7E-03	N/A	4E-04	8E-03
			Chromium	6E-07	N/A	4E-08	7E-07	Not identified	3E-03	N/A	2E-04	3E-03
			Iron	N/A	N/A	N/A	N/A	GI System	8E-03	N/A	1E-05	8E-03
			Vanadium	N/A	N/A	N/A	N/A	Hair	3E-03	N/A	4E-06	3E-03
			Chemical Total	1E-06	N/A	7E-08	1E-06		3E-02	N/A	6E-04	3E-02
		Exposure Point Total					1E-06					3E-02
	Exposure Medium Total						1E-06					3E-02
	Air	Emissions from Soil*	Chromium	N/A	3E-09	N/A	3E-09	Respiratory System	N/A	3E-06	N/A	3E-06
			Chemical Total	N/A	3E-09	N/A	3E-09		N/A	3E-06	N/A	3E-06
		Exposure Point Total					3E-09					3E-06
	Exposure Medium Total						3E-09					3E-06
Soil* Total							1E-06					3E-02
Receptor Total							1E-06				Receptor HI Total	3E-02

HI = Hazard Index

N/A = Not available/not applicable

GI = Gastrointestinal

Total Neurotoxicity(Neurological) HI Across All Media =	5E-03
Total Skin HI Across All Media=	8E-03
Total Vascular HI Across All Media =	8E-03
Total GI System HI Across All Media =	8E-03
Total Hair HI Across All Media =	3E-03
Total Respiratory System HI Across All Media =	3E-06

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TABLE 9.1.CTE

Summary of Receptor Risks and Hazards for COPCs

Central Tendency Exposure

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil*										
			Aluminum	N/A	N/A	N/A	N/A	Neurotoxicity	7E-03	N/A	8E-06	7E-03
			Arsenic	N/A	N/A	N/A	N/A	Skin, Vascular	7E-03	N/A	2E-04	7E-03
			Chromium	N/A	N/A	N/A	N/A	Not identified	4E-03	N/A	2E-04	4E-03
			Iron	N/A	N/A	N/A	N/A	GI System	8E-03	N/A	9E-06	8E-03
			Vanadium	N/A	N/A	N/A	N/A	Hair	3E-03	N/A	4E-06	3E-03
			Chemical Total	N/A	N/A	N/A	N/A		3E-02	N/A	4E-04	3E-02
		Exposure Point Total					N/A					3E-02
	Exposure Medium Total						N/A					3E-02
	Air	Emissions from Soil*	Chromium	N/A	N/A	N/A	N/A	Respiratory System	N/A	1E-04	N/A	1E-04
			Chemical Total	N/A	N/A	N/A	N/A		N/A	1E-04	N/A	1E-04
		Exposure Point Total					N/A					1E-04
	Exposure Medium Total						N/A					1E-04
Soil* Total							N/A					3E-02
Groundwater	Groundwater	Tap Water										
			1,1,2,2-Tetrachloroethane	N/A	N/A	N/A	N/A	Liver	6E-03	N/A	7E-04	7E-03
			1,1,2-Trichloroethane	N/A	N/A	N/A	N/A	Blood	4E-03	N/A	4E-04	5E-03
			1,2-Dichloroethane	N/A	N/A	N/A	N/A	Kidney	1E-03	N/A	5E-05	1E-03
			Benzene	N/A	N/A	N/A	N/A	Blood, Immune	3E-03	N/A	4E-04	3E-03
			Chloroform	N/A	N/A	N/A	N/A	Liver, Blood	4E-04	N/A	4E-05	4E-04
			cis-1,2-Dichloroethene	N/A	N/A	N/A	N/A	Kidney	2E-01	N/A	2E-02	3E-01
			Tetrachloroethene	N/A	N/A	N/A	N/A	Liver	9E-04	N/A	5E-04	1E-03
			trans-1,2-Dichloroethene	N/A	N/A	N/A	N/A	Blood	2E-02	N/A	1E-03	2E-02
			Trichloroethene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Vinyl chloride	N/A	N/A	N/A	N/A	Liver	2E-02	N/A	1E-03	2E-02
			Chemical Total	N/A	N/A	N/A	N/A		3E-01	N/A	3E-02	3E-01
		Exposure Point Total					N/A					3E-01
	Exposure Medium Total						N/A					3E-01

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TABLE 9.1.CTE

Summary of Receptor Risks and Hazards for COPCs

Central Tendency Exposure

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Air	Water Vapors at Showerhead	1,1,2,2-Tetrachloroethane	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			1,1,2-Trichloroethane	N/A	N/A	N/A	N/A	Liver	N/A	4E-02	N/A	4E-02
			1,2-Dichloroethane	N/A	N/A	N/A	N/A	Neurological	N/A	5E-04	N/A	5E-04
			Benzene	N/A	N/A	N/A	N/A	Blood, Immune	N/A	2E-04	N/A	2E-04
			Chloroform	N/A	N/A	N/A	N/A	Liver	N/A	2E-05	N/A	2E-05
			cis-1,2-Dichloroethene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Tetrachloroethene	N/A	N/A	N/A	N/A	Neurological	N/A	2E-05	N/A	2E-05
			trans-1,2-Dichloroethene	N/A	N/A	N/A	N/A	Lung, Liver	N/A	3E-03	N/A	3E-03
			Trichloroethene	N/A	N/A	N/A	N/A	N/A	N/A	3E-02	N/A	3E-02
			Vinyl chloride	N/A	N/A	N/A	N/A	Liver	N/A	6E-04	N/A	6E-04
			Chemical Total	N/A	N/A	N/A	N/A		N/A	8E-02	N/A	8E-02
		Exposure Point Total					N/A					8E-02
	Exposure Medium Total						N/A					8E-02
Groundwater Total							N/A					4E-01
Receptor Total							N/A				Receptor HI Total	4E-01

HI = Hazard Index

N/A = Not available/not applicable

GI = Gastrointestinal

Total Neurotoxicity(Neurological) HI Across All Media =	8E-03
Total Skin HI Across All Media=	7E-03
Total Vascular HI Across All Media =	7E-03
Total GI System HI Across All Media =	8E-03
Total Hair HI Across All Media =	3E-03
Total Respiratory System HI Across All Media =	1E-04
Total Liver HI Across All Media =	7E-02
Total Blood HI Across All Media =	3E-02
Total Kidney HI Across All Media =	3E-01
Total Immune HI Across All Media =	3E-03
Total Lung HI Across All Media =	3E-03

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TABLE 9.2.CTE

Summary of Receptor Risks and Hazards for COPCs

Central Tendency Exposure

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil*										
			Aluminum	N/A	N/A	N/A	N/A	Neurotoxicity	7E-02	N/A	8E-05	7E-02
			Arsenic	N/A	N/A	N/A	N/A	Skin, Vascular	6E-02	N/A	2E-03	7E-02
			Chromium	N/A	N/A	N/A	N/A	Not identified	3E-02	N/A	2E-03	4E-02
			Iron	N/A	N/A	N/A	N/A	GI System	8E-02	N/A	8E-05	8E-02
			Vanadium	N/A	N/A	N/A	N/A	Hair	3E-02	N/A	3E-05	3E-02
			Chemical Total	N/A	N/A	N/A	N/A		3E-01	N/A	4E-03	3E-01
		Exposure Point Total					N/A					3E-01
	Exposure Medium Total						N/A					3E-01
	Air	Emissions from Soil*	Chromium	N/A	N/A	N/A	N/A	Respiratory System	N/A	1E-04	N/A	1E-04
			Chemical Total	N/A	N/A	N/A	N/A		N/A	1E-04	N/A	1E-04
		Exposure Point Total					N/A					1E-04
	Exposure Medium Total						N/A					1E-04
Soil* Total							N/A					3E-01
Groundwater	Groundwater	Tap Water										
			1,1,2,2-Tetrachloroethane	N/A	N/A	N/A	N/A	Liver	2E-02	N/A	1E-03	2E-02
			1,1,2-Trichloroethane	N/A	N/A	N/A	N/A	Blood	1E-02	N/A	7E-04	1E-02
			1,2-Dichloroethane	N/A	N/A	N/A	N/A	Kidney	3E-03	N/A	9E-05	3E-03
			Benzene	N/A	N/A	N/A	N/A	Blood, Immune	9E-03	N/A	7E-04	9E-03
			Chloroform	N/A	N/A	N/A	N/A	Liver, Blood	1E-03	N/A	7E-05	1E-03
			cis-1,2-Dichloroethene	N/A	N/A	N/A	N/A	Kidney	8E-01	N/A	4E-02	9E-01
			Tetrachloroethene	N/A	N/A	N/A	N/A	Liver	3E-03	N/A	1E-03	4E-03
			trans-1,2-Dichloroethene	N/A	N/A	N/A	N/A	Blood	6E-02	N/A	3E-03	6E-02
			Trichloroethene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Vinyl chloride	N/A	N/A	N/A	N/A	Liver	8E-02	N/A	2E-03	8E-02
			Chemical Total	N/A	N/A	N/A	N/A		1E+00	N/A	5E-02	1E+00
		Exposure Point Total					N/A					1E+00
	Exposure Medium Total						N/A					1E+00

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TABLE 9.2.CTE

Summary of Receptor Risks and Hazards for COPCs

Central Tendency Exposure

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Air	Water Vapors at Showerhead	1,1,2,2-Tetrachloroethane	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			1,1,2-Trichloroethane	N/A	N/A	N/A	N/A	Liver	N/A	6E-02	N/A	6E-02
			1,2-Dichloroethane	N/A	N/A	N/A	N/A	Neurological	N/A	7E-04	N/A	7E-04
			Benzene	N/A	N/A	N/A	N/A	Blood, Immune	N/A	4E-04	N/A	4E-04
			Chloroform	N/A	N/A	N/A	N/A	Liver	N/A	4E-05	N/A	4E-05
			cis-1,2-Dichloroethene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Tetrachloroethene	N/A	N/A	N/A	N/A	Neurological	N/A	2E-05	N/A	2E-05
			trans-1,2-Dichloroethene	N/A	N/A	N/A	N/A	Lung, Liver	N/A	5E-03	N/A	5E-03
			Trichloroethene	N/A	N/A	N/A	N/A	N/A	N/A	5E-02	N/A	5E-02
			Vinyl chloride	N/A	N/A	N/A	N/A	Liver	N/A	8E-04	N/A	8E-04
			Chemical Total	N/A	N/A	N/A	N/A		N/A	1E-01	N/A	1E-01
		Exposure Point Total					N/A					1E-01
	Exposure Medium Total						N/A					1E-01
Groundwater Total							N/A					1E+00
Receptor Total							N/A				Receptor HI Total	1E+00

HI = Hazard Index

N/A = Not available/not applicable

GI = Gastrointestinal

Total Neurotoxicity(Neurological) HI Across All Media =	7E-02
Total Skin HI Across All Media=	7E-02
Total Vascular HI Across All Media =	7E-02
Total GI System HI Across All Media =	8E-02
Total Hair HI Across All Media =	3E-02
Total Respiratory System HI Across All Media =	1E-04
Total Liver HI Across All Media =	2E-01
Total Blood HI Across All Media =	9E-02
Total Kidney HI Across All Media =	9E-01
Total Immune HI Across All Media =	1E-02
Total Lung HI Across All Media =	5E-03

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TABLE 9.3.CTE

Summary of Receptor Risks and Hazards for COPCs

Central Tendency Exposure

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil*		N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Aluminum	3E-06	N/A	1E-07	3E-06		N/A	N/A	N/A	N/A
			Arsenic	3E-05	N/A	9E-05	1E-04		N/A	N/A	N/A	N/A
			Chromium	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Iron	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Vanadium	3E-05	N/A	9E-05	1E-04		N/A	N/A	N/A	N/A
			Chemical Total				1E-04					N/A
		Exposure Point Total					1E-04					N/A
	Exposure Medium Total											
	Air	Emissions from Soil*		N/A	1E-06	N/A	1E-06		N/A	N/A	N/A	N/A
			Chromium	N/A	1E-06	N/A	1E-06		N/A	N/A	N/A	N/A
			Chemical Total				1E-06					N/A
		Exposure Point Total					1E-06					N/A
	Exposure Medium Total						1E-04					N/A
Soil* Total												
Groundwater	Groundwater	Tap Water		1E-05	N/A	9E-07	1E-05		N/A	N/A	N/A	N/A
			1,1,2,2-Tetrachloroethane	4E-07	N/A	3E-08	4E-07		N/A	N/A	N/A	N/A
			1,1,2-Trichloroethane	2E-07	N/A	7E-09	2E-07		N/A	N/A	N/A	N/A
			1,2-Dichloroethane	2E-07	N/A	2E-08	3E-07		N/A	N/A	N/A	N/A
			Benzene	5E-08	N/A	3E-09	6E-08		N/A	N/A	N/A	N/A
			Chloroform	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			cis-1,2-Dichloroethene	2E-06	N/A	8E-07	3E-06		N/A	N/A	N/A	N/A
			Tetrachloroethene	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			trans-1,2-Dichloroethene	2E-06	N/A	2E-07	2E-06		N/A	N/A	N/A	N/A
			Trichloroethene	4E-05	N/A	6E-07	4E-05		N/A	N/A	N/A	N/A
			Vinyl chloride	5E-05	N/A	3E-06	5E-05		N/A	N/A	N/A	N/A
			Chemical Total				5E-05					N/A
		Exposure Point Total					5E-05					N/A
	Exposure Medium Total											

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TABLE 9.3.CTE
Summary of Receptor Risks and Hazards for COPCs
Central Tendency Exposure
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Air	Water Vapors at		N/A	6E-07	N/A	6E-07		N/A	N/A	N/A	N/A
		Showerhead	1,1,2,2-Tetrachloroethane	N/A	3E-08	N/A	3E-08		N/A	N/A	N/A	N/A
			1,1,2-Trichloroethane	N/A	2E-08	N/A	2E-08		N/A	N/A	N/A	N/A
			1,2-Dichloroethane	N/A	1E-08	N/A	1E-08		N/A	N/A	N/A	N/A
			Benzene	N/A	1E-08	N/A	1E-08		N/A	N/A	N/A	N/A
			Chloroform	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			cis-1,2-Dichloroethene	N/A	7E-09	N/A	7E-09		N/A	N/A	N/A	N/A
			Tetrachloroethene	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			trans-1,2-Dichloroethene	N/A	2E-07	N/A	2E-07		N/A	N/A	N/A	N/A
			Trichloroethene	N/A	9E-08	N/A	9E-08		N/A	N/A	N/A	N/A
			Vinyl chloride									
				N/A	9E-07	N/A	9E-07		N/A	N/A	N/A	N/A
			Chemical Total				9E-07					N/A
		Exposure Point Total					9E-07					N/A
	Exposure Medium Total						5E-05					N/A
Groundwater Total							2E-04				Receptor HI Total	N/A
Receptor Total							2E-04				Receptor HI Total	N/A

HI = Hazard Index
N/A = Not available/not applicable

Appendix F
TABLE 10.1.RME
Risk Summary
Reasonable Maximum Exposure
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Tap Water	1,1,2,2-Tetrachloroethane	N/A	N/A	N/A	N/A	Liver	1E-01	N/A	1E-02	1E-01
			cis-1,2-Dichloroethene	N/A	N/A	N/A	N/A	Kidney	2E+00	N/A	1E-01	2E+00
			Vinyl chloride	N/A	N/A	N/A	N/A	Liver	9E-02	N/A	5E-03	1E-01
			Chemical Total	N/A	N/A	N/A	N/A		2E+00	N/A	2E-01	2E+00
		Exposure Point Total					N/A					2E+00
	Exposure Medium Total						N/A					2E+00
Groundwater	Air	Water Vapors at Showerhead	1,1,2-Trichloroethane	N/A	N/A	N/A	N/A	Liver	N/A	8E-01	N/A	8E-01
			Trichloroethene	N/A	N/A	N/A	N/A	N/A	N/A	9E-01	N/A	9E-01
			Chemical Total	N/A	N/A	N/A	N/A		N/A	2E+00	N/A	2E+00
		Exposure Point Total					N/A					2E+00
	Exposure Medium Total						N/A					2E+00
Groundwater Total							N/A					4E+00
Receptor Total							N/A				Receptor HI Total	4E+00

HI = Hazard Index
N/A = Not available/not applicable
GI = Gastrointestinal

Total Liver HI Across All Media =	1E+00
Total Kidney HI Across All Media =	2E+00

Appendix F
TABLE 10.2.RME
Risk Summary
Reasonable Maximum Exposure
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil*	Aluminum	N/A	N/A	N/A	N/A	Neurotoxicity	2E-01	N/A	6E-04	2E-01
			Arsenic	N/A	N/A	N/A	N/A	Skin, Vascular	3E-01	N/A	2E-02	3E-01
			Chromium	N/A	N/A	N/A	N/A	Not identified	1E-01	N/A	1E-02	1E-01
			Iron	N/A	N/A	N/A	N/A	GI System	3E-01	N/A	9E-04	3E-01
			Vanadium	N/A	N/A	N/A	N/A	Hair	1E-01	N/A	3E-04	1E-01
			Chemical Total	N/A	N/A	N/A	N/A		1E+00	N/A	4E-02	1E+00
		Exposure Point Total					N/A					1E+00
	Exposure Medium Total						N/A					1E+00
Soil* Total							N/A					1E+00
Groundwater	Groundwater	Tap Water	1,1,2,2-Tetrachloroethane	N/A	N/A	N/A	N/A	Liver	3E-01	N/A	3E-02	3E-01
			cis-1,2-Dichloroethene	N/A	N/A	N/A	N/A	Kidney	4E+00	N/A	3E-01	4E+00
			trans-1,2-Dichloroethene	N/A	N/A	N/A	N/A	Blood	2E-01	N/A	1E-02	2E-01
			Vinyl chloride	N/A	N/A	N/A	N/A	Liver	2E-01	N/A	1E-02	2E-01
			Chemical Total	N/A	N/A	N/A	N/A		4E+00	N/A	4E-01	5E+00
		Exposure Point Total					N/A					5E+00
	Exposure Medium Total						N/A					5E+00
Groundwater	Air	Water Vapors at Showerhead	1,1,2-Trichloroethane	N/A	N/A	N/A	N/A	Liver	N/A	1E+00	N/A	1E+00
			trans-1,2-Dichloroethene	N/A	N/A	N/A	N/A	Lung, Liver	N/A	1E-01	N/A	1E-01
			Trichloroethene	N/A	N/A	N/A	N/A	N/A	N/A	1E+00	N/A	1E+00
			Chemical Total	N/A	N/A	N/A	N/A		N/A	3E+00	N/A	3E+00
		Exposure Point Total					N/A					3E+00
	Exposure Medium Total						N/A					3E+00
Groundwater Total							N/A					8E+00
Receptor Total							N/A				Receptor HI Total	9E+00

Total Neurotoxicity(Neurological) HI Across All Media =	2E-01
Total Skin HI Across All Media=	3E-01
Total Vascular HI Across All Media =	3E-01
Total GI System HI Across All Media =	3E-01
Total Hair HI Across All Media =	1E-01
Total Liver HI Across All Media =	2E+00
Total Blood HI Across All Media =	2E-01
Total Kidney HI Across All Media =	4E+00
Total Lung HI Across All Media =	1E-01

HI = Hazard Index
N/A = Not available/not applicable
GI = Gastrointestinal

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TABLE 10.3.RME

Risk Summary

Reasonable Maximum Exposure

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil*	Arsenic	2E-05	N/A	2E-06	2E-05		N/A	N/A	N/A	N/A
			Chromium	9E-05	N/A	1E-05	1E-04		N/A	N/A	N/A	N/A
			Chemical Total	1E-04	N/A	1E-05	1E-04		N/A	N/A	N/A	N/A
		Exposure Point Total					1E-04					N/A
	Exposure Medium Total						1E-04					N/A
	Air	Emissions from Soil*	Chromium	N/A	2E-06	N/A	2E-06		N/A	N/A	N/A	N/A
			Chemical Total	N/A	2E-06	N/A	2E-06		N/A	N/A	N/A	N/A
		Exposure Point Total					2E-06					N/A
	Exposure Medium Total						2E-06					N/A
Soil* Total							1E-04					N/A
Groundwater	Groundwater	Tap Water	1,1,2,2-Tetrachloroethane	2E-04	N/A	3E-05	3E-04		N/A	N/A	N/A	N/A
			1,1,2-Trichloroethane	2E-06	N/A	2E-07	2E-06		N/A	N/A	N/A	N/A
			Benzene	1E-06	N/A	2E-07	1E-06		N/A	N/A	N/A	N/A
			Tetrachloroethene	7E-06	N/A	4E-06	1E-05		N/A	N/A	N/A	N/A
			Trichloroethene	1E-05	N/A	2E-06	1E-05		N/A	N/A	N/A	N/A
			Vinyl chloride	2E-04	N/A	8E-06	2E-04		N/A	N/A	N/A	N/A
			Chemical Total	4E-04	N/A	4E-05	5E-04		N/A	N/A	N/A	N/A
		Exposure Point Total					5E-04					N/A
	Exposure Medium Total						5E-04					N/A

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TABLE 10.3.RME

Risk Summary

Reasonable Maximum Exposure

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Air	Water Vapors at Showerhead										
			1,1,2,2-Tetrachloroethane	N/A	1E-04	N/A	1E-04		N/A	N/A	N/A	N/A
			1,1,2-Trichloroethane	N/A	1E-06	N/A	1E-06		N/A	N/A	N/A	N/A
			trans-1,2-Dichloroethene	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Trichloroethene	N/A	9E-06	N/A	9E-06		N/A	N/A	N/A	N/A
			Vinyl chloride	N/A	3E-06	N/A	3E-06		N/A	N/A	N/A	N/A
			Chemical Total	N/A	1E-04	N/A	1E-04		N/A	N/A	N/A	N/A
		Exposure Point Total					1E-04					N/A
	Exposure Medium Total						1E-04					N/A
Groundwater Total							6E-04					N/A
Receptor Total							7E-04				Receptor HI Total	N/A

HI = Hazard Index
N/A = Not available/not applicable

Appendix G
Ecological Risk Assessment

CHECKLIST FOR ECOLOGICAL ASSESSMENTS/SAMPLING

I. SITE LOCATION

1. Site Name Site 49 – MCAS Suspected Minor Dump
US EPA ID Number ____
Location United States Marine Corps Base (MCB), Camp Lejeune
County Onslow_____________ City Jacksonville_________ State NC_____

2. Latitude___34°42’42.14” N________ Longitude__77°25’49.36” W____________

3. Attach site maps, including a topographical map, a diagram which illustrates the layout of the facility (e.g., site boundaries, structures, etc.), and maps showing all habitat areas identified in Section III of the checklist. Also, include maps which illustrate known and suspected release areas, sampling locations and any other important features, if available.

II. SITE CHARACTERIZATION

1. Indicate the approximate area of the site (i.e., acres or sq. ft.) One acre. Approximately, 1/3 is developed. Two-thirds of the site is forested. A portion of the forested area is wetland. The forest and wetland extend beyond the boundary of the site. The site is adjacent to the New River.

2. Is this the first site visit? □ Yes X No
If no, attach trip report of previous site visit(s), if available.
Trip report is not available.

Dates(s) of previous site visit(s) Visits to the site were conducted by CH2M HILL staff one time in 2008 for reconnaissance and on several dates in July 2009, during sampling events.

3. Are aerial or other site photographs available? X Yes □ No
If yes, please attach any available photo(s) to the site map to the report.
Figure 2-2 of this report.

4. Provide an approximate breakdown of the land uses on the site:

_____% Heavy Industrial	_50___% Light Industrial	_____% Urban
_____% Residential	_____% Rural	_____% Agricultural[b]
_____% Recreational[a]	_50__% Undisturbed	_____% Other[c]

[a]For recreational areas, please describe the use of the area (e.g., park, playing field, etc).
____

[b]For agricultural areas, please list the crops and/or livestock which are present.

____

[c]For areas designated as "other," please describe the use of the area.
____

5. Provide an approximate breakdown of the land uses in the area surrounding the site. Indicate the radius (in miles) of the area described: _______0.5 mile radius____________

_____% Heavy Industrial	__20___% Light Industrial	_____% Urban
_____% Residential	_____% Rural	____% Agricultural[b]
_____% Recreational[a]	_____% Undisturbed	__80__% Other [c]

[a]For recreational areas, please describe the use of the area (e.g., park, playing field, golf course, etc).
____

[b]For agricultural areas, please list the crops and/or livestock which are present.
____

[c]For areas designated as "other," please describe the use of the area.
___McCutcheon Air Field and associated runways_________________________

6. Has any movement of soil taken place at the site? □ Yes X No
If yes, indicate the likely source of the disturbance, (e.g., erosion, agricultural, mining, industrial activities, removals, etc.) degree of disturbance, and estimate when these events occurred. Fill material located in boring logs, manicured lawns with planted shrubs present in open field area.

7. Do any sensitive environmental areas exist adjacent to or in proximity to the site, (e.g., Federal and State parks, National and State monuments, wetlands)? *Remember, flood plains and wetlands are not always obvious; do not answer "no" without confirming information. See Table 1 for a list of contacts.* ~~No~~
Wetlands are present within and directly adjacent to the Site 49 boundaries. The New River is adjacent to the site.

Please provide the source(s) of information used to identify these sensitive areas, and indicate their general location on the site map.
United States Marine Corps (USMC). 2006. Integrated Natural Resource Management Plan (INRMP) 2007-2011, Marine Corps Base Camp Lejeune, Onslow County, North Carolina. November.

8. What type of facility is located at the site?

☐ Chemical ☐ Manufacturing ☐ Mixing

X Waste Disposal X Other (specify) Supply storage.

Site 49 was reported to contain minor quantities of paint related waste.

9. Identify the contaminants of potential concern (COPCs) at the site. If known, include the maximum contaminant levels. Please indicate the source of data cited (e.g., RFI, confirmatory sampling, etc).
Site 49 was originally identified during the 1983 Initial Assessment Study (IAS) conducted by Water and Air Research, Inc (WAR). Based upon limited historical information, the IAS concluded that 10 sites, including Site 49, did not require further assessment. This decision was primarily due to the lack of specific evidence to suggest the presence of hazardous or toxic substances. To confirm the validity of the original determination of no further assessment, site media were analyzed for metals, VOCs and SVOCs (see the Remedial Investigation for concentration information).

10. Check any potential routes of off-site migration of contaminants observed at the site:

☐ Swales ☐ Depressions X Drainage Ditches

X Runoff ☐ Windblown Particulates ☐ Vehicular Traffic

X Other (specify): Groundwater

11. Indicate the approximate depth to groundwater (in feet below ground surface [(bgs)].
The water table was encountered at depths ranging from approximately 4.2 to 6.8 feet bgs.

12. Indicate the direction of groundwater flow (e.g., north, southeast, etc.)
Groundwater at Site 49 generally flows towards the New River, but is tidally influenced.

13. Is the direction of surface runoff apparent from site observations? X Yes ☐ No
If yes, to which of the following does the surface runoff discharge? Indicate all that apply.

X Surface water X Groundwater ☐ Sewer

☐ Collection Impoundment

14. Is there a navigable water body or tributary to a navigable water body?
X Yes ☐ No

15. Is there a water body anywhere on or in the vicinity of the site? If yes, also complete Section III.B.1: Aquatic Habitat Checklist -- Non-Flowing Systems and/or Section III.B.2: Aquatic Habitat Checklist -- Flowing Systems.

    X Yes (approx. distance: borders site) ☐ No

16. Is there evidence of flooding? ☐ Yes X No
    Wetlands and flood plains are not always obvious. Do not answer "no" without confirming information. If yes, complete Section III.C: Wetland Habitat Checklist.

17. If a field guide was used to aid any of the identifications, please provide a reference. Also, estimate the time spent identifying fauna. (Use a blank sheet if additional space is needed for text.)

18. Are any threatened and/or endangered species (plant or animal) known to inhabit the area of the site? ☐ Yes X No
    If yes, you are required to verify this information with the U.S. Fish and Wildlife Service or other appropriate agencies (see Table 1 for a list of contacts). If species' identities are known, please list them next.

19. Record weather conditions at the site at the time of the site visit when information for completion of this checklist was prepared:

    DATE July 2009

    Warm Temperature (°C/°F)

    Wind (direction/speed):

    Cloud Cover: Cloudy

    Normal daily high temperature (°C/°F):

    Precipitation (rain, snow):

20. Describe reasonable and likely future land and/or water use(s) at the site.
    Land and water use will likely remain the same.

21. Describe the historical uses of the site. Include information on chemical releases that may have occurred as a result of previous land uses. For each chemical release, provide information on the form of the chemical released (i.e., solid, liquid, vapor) and the known or suspected causes or mechanism of the release (i.e., spills, leaks, material disposal, dumping, explosion, etc.).

According to the IAS report (WAR, 1983), Site 49 was reported to contain minor quantities of paint related waste. During a December 2008 reconnaissance by CH2M HILL staff, red bricks were observed along the shoreline but no other wastes.

22. Identify the media (e.g., soil [surface or subsurface], surface water, air, groundwater) which are known or suspected to contain COCs.

Soil and groundwater may contain COPCs.

II.A. SUMMARY OF OBSERVATIONS AND SITE SETTING

Include information on significant source areas and migration pathways that are likely to constitute complete exposure pathways.

Several VOCs, SVOCs, and metals were detected in the soils and VOCs and metals were detected in groundwater. Soil exposure and surface water exposure may be complete pathways.

Checklist Completed by__Demitria Wright Updated by Sara Kent__________

Affiliation__CH2M HILL____

Author Assisted by____ ______________________

Date__11/12/2009____Updated: 07/06/2010_______________________________

III. HABITAT EVALUATION

III.A Terrestrial Habitat Checklist

III.A.1 Wooded

Are any wooded areas on or adjacent to the site? X Yes ☐ No

If yes, indicate the wooded area on the attached site map and answer the following questions. If more than one wooded area is present on or adjacent to the site, make additional copies of the following questions and fill out for each individual wooded area. Distinguish between wooded areas by using names or other designations, and clearly identify each area on the site map.

If no, proceed to Section III.A.2: Shrub/Scrub

Wooded Area Questions

X On-site ☐ Off-site

Name or Designation: <u>Site 49 – MCAS Suspected Minor Dump area</u>

1. Estimate the approximate size of the wooded area. <u>Approximately 3.5 acres</u>

   Please identify what information was used to determine the wooded area of the site (e.g., direct observation, photos, etc).
   <u>Aerial imagery available on Google Earth</u>

2. Indicate the dominant type of vegetation in the wooded area. Provide photographs, if available.

   X Evergreen
   ☐ Deciduous
   ☐ Mixed

   Dominant plant species, if known: <u>Pine</u>

3. Estimate the vegetation density of the wooded area.

   X Dense (i.e., greater than 75% vegetation)
   ☐ Moderate (i.e., 25% to 75% vegetation)
   ☐ Sparse (i.e., less than 25% vegetation)

4. Indicate the predominant size of the trees at the site. Use diameter at breast height.

X 0-6 inches
- ❑ 6-12 inches
- ❑ >12 inches
- ❑ No single size range is predominant

5. Specify type of understory present, if known. Provide a photograph, if available.

III.A.2 Shrub/Scrub

Are any shrub/scrub areas on or adjacent to the site? ☐ Yes X No

If yes, indicate the shrub/scrub area on the attached site map and answer the following questions. If more than one shrub/scrub area is present on or adjacent to the site, make additional copies of the following questions and fill out for each individual shrub/scrub area. Distinguish between shrub/scrub areas, using names or other designations, and clearly identify each area on the site map.

If no, proceed to Section III.A.3: Open Field

III.A.3 Open Field

Are any open field areas on or adjacent to the site? ☐ Yes X No

If yes, indicate the open field area on the attached site map and answer the following questions. If more than one open field area is present on or adjacent to the site, make additional copies of the following questions and fill out for each individual open field area. Distinguish between open field areas, using names or other designations, and clearly identify each area on the site map.

If no, proceed to Section III.A.4: Miscellaneous

III.A.4 Miscellaneous

Are other types of terrestrial habitats present at the site, other than woods, scrub/shrub and open field? ☐ Yes X No

If yes, indicate the area on the attached site map and answer the following questions. If more than one of these areas are present on or adjacent to the site, make additional copies of the following questions and fill out for each individual area. Distinguish between areas by using names or other designations. Clearly identify each area on the site map.

If no, proceed to Section III.B: Aquatic Habitats.

III.B Aquatic Habitats

Note: Aquatic systems are often associated with wetland habitats. Please refer to Section III.C, Wetland Habitat Checklist.

III.B.1 Non-Flowing Systems

Are any non-flowing aquatic features (such as ponds or lakes) located at or adjacent to the site?

☐ Yes X No

If yes, indicate the aquatic feature on the attached site map and answer the following questions regarding the non-flowing aquatic features. If more than one non-flowing aquatic feature is present on or adjacent to the site, make additional copies of the following questions and fill out for each individual aquatic feature. Distinguish between aquatic features by using names or other designations. Clearly identify each area on the site map.

If no, proceed to Section III.B.2: Flowing Systems

III.B.2 Flowing Systems

Note: Aquatic systems are often associated with wetland habitats. Please refer to Section III.C, Wetland Habitat Checklist.

Are any flowing aquatic features (such as streams or rivers) located at or adjacent to the site?

X Yes ☐ No

If yes, indicate the system on the attached site map and answer the following questions regarding the flowing system. If more than one flowing system is present on or adjacent to the site, make additional copies of the following questions and complete one set for each individual aquatic feature. Distinguish between flowing systems by using names or other designation. Clearly identify each area on the site map

If no, proceed to Section III.C: Wetlands Habitats.

Flowing Aquatic Systems Questions

☐ On-site X Off-site

Name or Designation:__New River__________________________________

1. Indicate the type of flowing aquatic feature present.

   X River
   ☐ Stream/Creek/Brook
   ☐ Intermittent stream
   ☐ Artificially created (ditch, etc.)
   ☐ Channeling
   ☐ Other (specify)

2. For natural systems, are there any indicators of physical alteration (e.g., channeling, debris, etc.)? X Yes ☐ No
   If yes, please describe the indicators observed.

Bricks have been dumped on shoreline.

3. Indicate the general composition of the bottom substrate.

☐ Bedrock	X Sand (course)	☐ Concrete
☐ Boulder (>10 in.)	X Silt (fine)	X Debris
☐ Cobble (2.5 - 10 in.)	X Clay (slick)	X Detritus
☐ Gravel (0.1 - 2.5 in.)	X Muck (fine/black)	☐ Marl (Shells)

   ☐ Other (please specify):____

4. Describe the condition of the bank (e.g., height, slope, extent of vegetative cover).
   Trees occur along the bank. Along the edge of the site, the bank gradually slopes to the water.

5. Is the system influenced by tides? X Yes ☐ No
   What information was used to make this determination?
   Visual observations and tide charts (http://www.tides.info/?command=view&location=New+River+Inlet%2C+North+Carolina); based on observations, tide seems to fluctuate approximately <1 ft in either direction.

6. Is the flow intermittent? ☐ Yes X No
   If yes, please note the information used to make this determination.

Flowing System Questions (Continued)

7. Is there a discharge from the site to the water body? X Yes ☐ No
   If yes, describe the origin of each discharge and its migration path.
   Groundwater discharges to the river.

8. Indicate the discharge point of the water body. Specify name of the discharge, if known.
   The groundwater discharges along the New River shoreline, which then flows to the Atlantic Ocean.

9. Identify any field measurements and observations of water quality that were made. Provide the measurement and the units of measure in the appropriate space below:

   _____ Width (ft.)

   _____ Depth (average)

   _____ Velocity (specify units):______________

   _____ Temperature (depth of water where the reading was taken)_____

   _____ pH

   _____ Dissolved oxygen

   _____ Salinity

   _____ Turbidity (clear, slightly turbid, turbid, opaque)
   (Secchi disk depth_____)

   _____ Other (specify)

10. Describe observed color and area of coloration.

11. Is any aquatic vegetation present? X Yes ☐ No
    If yes, please identify the type of vegetation present, if known.

    ☐ Emergent X Submergent ☐ Floating

Flowing System Questions (Continued)

12. Mark the flowing water system on the attached site map.

13. What observations were made at the water body regarding the presence and/or absence of benthic macroinvertebrates, fish, birds, mammals, etc?

Crab exoskeletons present at top of riprap along river, adjacent to open grass area.

Flowing Aquatic Systems Questions

X On-site ☐ Off-site

Name or Designation: __Unnamed drainage feature____________________

14. Indicate the type of flowing aquatic feature present.

- ☐ River
- ☐ Stream/Creek/Brook
- X Intermittent stream
- ☐ Artificially created (ditch, etc.)
- ☐ Channeling
- ☐ Other (specify)

15. For natural systems, are there any indicators of physical alteration (e.g., channeling, debris, etc.)? ☐ Yes X No
If yes, please describe the indicators observed.

16. Indicate the general composition of the bottom substrate. No observation recorded.

☐ Bedrock	☐ Sand (course)	☐ Concrete
☐ Boulder (>10 in.)	☐ Silt (fine)	☐ Debris
☐ Cobble (2.5 - 10 in.)	☐ Clay (slick)	☐ Detritus
☐ Gravel (0.1 - 2.5 in.)	☐ Muck (fine/black)	☐ Marl (Shells)

☐ Other (please specify):____

17. Describe the condition of the bank (e.g., height, slope, extent of vegetative cover).
Trees occur along the bank. The bank gradually slopes to the water.

18. Is the system influenced by tides? X Yes ☐ No
What information was used to make this determination?
Proximity to New River.

19. Is the flow intermittent? X Yes ☐ No
    If yes, please note the information used to make this determination.

20. Is there a discharge from the site to the water body? X Yes ☐ No
    If yes, describe the origin of each discharge and its migration path.
    <u>Stormwater runoff potentially flows to this drainage feature and the associated wetland.</u>

21. Indicate the discharge point of the water body. Specify name of the discharge, if known.
    <u>The drainage flows into the New River.</u>

22. Identify any field measurements and observations of water quality that were made. Provide the measurement and the units of measure in the appropriate space below:

    _____ Width (ft.)

    _____ Depth (average)

    _____ Velocity (specify units):_______________

    _____ Temperature (depth of water where the reading was taken)_____

    _____ pH

    _____ Dissolved oxygen

    _____ Salinity

    _____ Turbidity (clear, slightly turbid, turbid, opaque) (Secchi disk depth_____)

    _____ Other (specify)

23. Describe observed color and area of coloration.

24. Is any aquatic vegetation present? X Yes ☐ No
    If yes, please identify the type of vegetation present, if known.

    X Emergent X Submergent ☐ Floating
    <u>Cattails (sp.) and herbaceous vegetation were observed growing in creek during the 2008 reconnaissance.</u>

25. Mark the flowing water system on the attached site map. <u>Drainage is within the wetland denoted in Figure 2-2</u>

26. What observations were made at the water body regarding the presence and/or absence of benthic macroinvertebrates, fish, birds, mammals, etc? <u>Small fish and snakes</u>

III.C Wetland Habitats

Are any wetland[1] areas such as marshes or swamps on or adjacent to the site?

X Yes ☐ No

If yes, indicate the wetland area on the attached site map and answer the following questions regarding the wetland area. If more than one wetland area is present on or adjacent to the site, make additional copies of the following questions and fill out one for each individual wetland area. Distinguish between wetland areas by using names or other designations (such as location). Clearly identify each area on the site map. Also, obtain and attach a National Wetlands Inventory Map (or maps) to illustrate each wetland area.

Identify the sources of the observations and information (e.g., National Wetland Inventory, Federal or State Agency, USGS topographic maps) used to make the determination whether or not wetland areas are present.
MCB, Camp Lejeune, North Carolina 2007-2011 Integrated Natural Resource Management Plan (INRMP), 2006.

MCB Camp Lejeune GIS Layer for Wetlands

If no wetland areas are present, proceed to Section III.D: Sensitive Environments and Receptors.

[1] Wetlands are defined in 40 CFR §232.2 as " Areas inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions." Examples of typical wetlands plants include: cattails, cordgrass, willows and cypress trees. National wetland inventory maps may be available at http:\\nwi.fws.gov. Additional information on wetland delineation criteria is also available from the Army Corps of Engineers.

Wetland Area Questions

X On-site X Off-site

Name or Designation: Wetlands associated with the intermittent drainage

1. Indicate the approximate area of the wetland (acres or ft.^{2}) Based on available mapping, the wetland is approximately 1.3 acres. However, a wetland delineation has not been conducted by CH2M HILL personnel for this area.

2. Identify the type(s) of vegetation present in the wetland.

   - ❑ Submergent (i.e., underwater) vegetation
   - ❑ Emergent (i.e., rooted in the water, but rising above it) vegetation
   - ❑ Floating vegetation
   - ❑ Scrub/shrub
   - X Wooded
   - ❑ Other (Please describe):________________________________

3. Provide a general description of the vegetation present in and around the wetland (height, color, etc). Provide a photograph of the known or suspected wetlands, if available.

   The wetland is mostly forested. There is emergent vegetation near the river.

4. Estimate the vegetation density of the wetland area.

   - ❑ Dense (i.e., greater than 75% vegetation)
   - X Moderate (i.e., 25% to 75% vegetation)
   - ❑ Sparse (i.e., less than 25% vegetation)

5. Is standing water present? X Yes ☐ No
   If yes, is the water primarily: X Fresh ☐ Brackish
   Indicate the approximate area of the standing water (ft.^{2}):
   Indicate the approximate depth of the standing water, if known (ft. or in.) Approximately 6” inches on 3/11/11

Wetland Area Questions (Continued)

6. Identify any field measurements and observations of water quality that were made. Provide the measurement and the units of measure in the appropriate space below:

Depth (average)

Temperature

pH

Dissolved oxygen

Salinity

Turbidity (clear, slightly turbid, turbid, opaque) (Secchi disk depth_____)

Other (specify)

Other(specify)

7. Describe observed color and area of coloration.

8. If known, indicate the source of the water in the wetland.

❑ Stream/River/Creek/Lake/Pond
X Flooding (Potentially)
❑ Groundwater
X Surface runoff

9. Is there a discharge from the site to the wetland? X Yes ☐ No

If yes, please describe:
The wetland surrounds the intermittent drainage area. Runoff from the site may flow into or through the wetland to the creek.

Wetland Area Questions (Continued)

10. Is there a discharge from the wetland? X Yes ☐ No
If yes, to what water body is discharge released?

- ❑ Marine (Name:_____________________________)
- X Surface stream/River (Name: _New River_)
- ❑ Lake/Pond (Name:_____________________________)
- ❑ Groundwater
- ❑ Not sure

11. Does the area show evidence of flooding? X Yes ☐ No
If yes, indicate which of the following are present (mark all that apply).

- X Standing water
- ❑ Water-saturated soils
- ❑ Water marks
- ❑ Buttressing
- ❑ Debris lines
- ❑ Mud cracks
- ❑ Other (please describe)

11. If a soil sample was collected, describe the appearance of the soil in the wetland area. Circle or write in the best response. None collected.

Color (blue/gray, brown, black, mottled) __________________________

Water content (dry, wet, saturated/unsaturated)______________________

12. Mark the observed wetland area(s) on the attached site map.
See Figure 2-2.

III.D Sensitive Environments and Receptors

1. Do any other potentially sensitive environmental areas[2] exist adjacent to or within one-half mile of the site? If yes, list these areas and provide the source(s) of information used to identify sensitive areas. *Do not answer "no" without confirmation from the U.S. Fish and Wildlife Service and other appropriate agencies. See Table 1 for a list of contacts.*
Jurisdictional wetlands are located within and directly adjacent to the site boundary.

4. Are any areas on or near (i.e., within one-half mile) the site owned or used by local tribes? If yes, describe. No

3. Does the site serve or potentially serve as a habitat, foraging area or refuge by rare, threatened, endangered, candidate and/or proposed species (plants or animals), or any otherwise protected species? If yes, identify species. *This information should be obtained from the U.S. Fish and Wildlife Service and other appropriate agencies. See Table 1 for a list of contacts.*
No verified sightings. There is anecdotal information regarding the use of the wetland by an alligator.

5. Is the site potentially used as a breeding, roosting or feeding area by migratory bird species? If yes, identify which species.
Unknown

6. Is the site used by any ecologically[3], recreationally or commercially important species? If yes, explain.
No

[3] Areas that provide unique and often protected habitat for wildlife species. These areas are typically used during critical life stages such as breeding, hatching, rearing of young and overwintering. Refer to Table 2 at the end of this document for examples of sensitive environments.

[3] Ecologically important species include populations of species which provide a critical (i.e., not replaceable) food resource for higher organisms. These species' functions would not be replaced by more tolerant species or perform a critical ecological function (such as organic matter decomposition) and will not be replaced by other species. Ecologically important species include pest and opportunistic species that populate an area if they serve as a food source for other species, but do not include domesticated animals (e.g., pets and livestock) or plants/animals whose existence is maintained by continuous human interventions (e.g., fish hatcheries, agricultural crops, etc).

IV. EXPOSURE PATHWAY EVALUATION

1. Do existing data provide sufficient information on the nature, rate and extent of contamination at the site?

- ❑ Yes
- X No
- ❑ Uncertain

Please provide an explanation for your answer.
Data were collected from groundwater and subsurface soil. Surface water and sediment samples were not collected from the wetlands and intermittent drainage onsite.

2. Do existing data provide sufficient information on the nature, rate and extent of contamination in offsite affected areas?

- ❑ Yes
- X No
- ❑ Uncertain
- ❑ No offsite contamination

Please provide an explanation for your answer.

See #1 of this section.

3. Do existing data address potential migration pathways of contaminants at the site?

- ❑ Yes
- ❑ No
- X Uncertain

Please provide an explanation for your answer.

Data were collected based on potential migration pathways (i.e. leaching). However, data was not collected from the intermittent drainage or wetland onsite to evaluate overland flow pathways.

4. Do existing data address potential migration pathways of contaminants in offsite affected areas?

- ❑ Yes
- ❑ No
- X Uncertain
- ❑ No offsite contamination

Please provide an explanation for your answer. <u>See response #2 of this section.</u>

5. Are there visible indications of stressed habitats or receptors on or near (i.e., within one-half mile) the site that may be the result of a chemical release? If yes, explain. Attach photographs if available.

<u>No</u>

6. Is the location of the contamination such that receptors might be reasonably expected to come into contact with it? For soil, this means contamination in the soil 0 to 1 foot below ground surface (bgs). If yes, explain.

<u>Yes. The site is in close proximity to the New River and wetlands. If contamination is present in groundwater it may migrate into these resources via the groundwater-to-surface water pathway. VOCs, SVOCs, and metals were detected in areas where plant and invertebrate receptors may be exposed in soil.</u>

7. Are receptors located in or using habitats where chemicals exist in air, soil, sediment or surface water? If yes, explain.

<u>Yes. Aquatic receptors are present in the New River. Birds and other transient receptors may use the site, but due to the development surrounding the area and limited available terrestrial habitat onsite, exposure would be limited.</u>

8. Could chemicals reach receptors via groundwater? Can chemicals leach or dissolve to groundwater? Are chemicals mobile in groundwater? Does groundwater discharge into receptor habitats? If yes, explain.

   Yes. See #6 of this section.

9. Could chemicals reach receptors through runoff or erosion? Answer the following questions.

   If contamination is present in surface soil, it could reach receptors via runoff from the site. However, this is unlikely due to the relatively flat topography of the site.

   What is the approximate distance from the contaminated area to the nearest watercourse?

   ❑ 0 feet (i.e., contamination has reached a watercourse)
   X 1-10 feet
   ❑ 11-20 feet
   ❑ 21-50 feet
   ❑ 51-100 feet
   ❑ 101-200 feet
   ❑ > 200 feet
   ❑ > 500 feet
   ❑ > 1000 feet

   What is the slope of the ground in the contaminated area?

   X 0-10%
   ❑ 10-30%
   ❑ > 30%

   What is the approximate amount of ground and canopy vegetative cover in the contaminated area?

   ❑ < 25%
   X 25-75%
   ❑ > 75%

   Is there visible evidence of erosion (e.g., a rill or gully) in or near the contaminated area?

   ❑ Yes
   X No
   ❑ Do not know

Do any structures, pavement or natural drainage features direct run-on flow (i.e., surface flows originating upstream or uphill from the area of concern) into the contaminated area?

X Yes
❑ No
❑ Do not know

At least two drainage ditches up-gradient of the site flow under the Longstaff Street and into the creek.

Could chemicals reach receptors through the dispersion of contaminants in air (e.g., volatilization, vapors, fugitive dust)? If yes, explain.

No. See #6 of this section.

Could chemicals reach receptors through migration of non-aqueous phase liquids (NAPLs)? Is a NAPL present at the site that might be migrating towards receptors or habitats? Could NAPL discharge contact receptors or their habitat?

No

TABLE G-1

Threatened and Endangered Species List for Onslow County, North Carolina

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Scientific Name	Common Name	Federal Status
Vertebrates		
Chelonia mydas	Green sea turtle	T
Caretta caretta	Loggerhead sea turtle	T
Dermochelys coriacea	Leatherback sea turtle	E
Trichechus manatus	West Indian manatee	E
Charadrius melodus	Piping plover	T
Acipenser brevirostrum	Shortnose sturgeon	E
Picoides borealis	Red-cockaded woodpecker	E
Vascular Plants		
Thalictrum cooleyi	Cooley's meadowrue	E
Carex lutea	Golden sedge	E
Lindera melissifolia	Pondberry	E
Lysimachia asperulaefolia	Rough-leaved loosestrife	E
Amaranthus pumilus	Seabeach amaranth	T

Notes:

E - Endangered - A taxon in danger of extinction throughout all or a significant portion of its range.

T - Threatened - A taxon likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

Generated By: Sara Kent/ATL

Checked by: Rachel Zajac/RDU

TABLE G-2

Samples Used in the Ecological Risk Assessment (ERA) for Site 49

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Sample ID	Sample Depth (ft bgs)	Date
Surface Soils		
IR49-SS02-11A	0-1	3/29/2011
IR49-SS03-11A	0-1	3/29/2011
IR49-SS04-11A	0-1	3/29/2011
IR49-SS05-11A	0-1	3/29/2011
IR49-SS06-11A	0-1	3/29/2011
IR49-SS07-11A	0-1	3/29/2011
IR49-SS08-11A	0-1	3/28/2011
IR49-SS08-11B	0-1	4/18/2011
IR49-SS09-11A	0-1	3/28/2011
IR49-SS09D-11A	0-1	3/28/2011
IR49-SS010-11A	0-1	3/28/2011
IR49-SS11-11A	0-1	3/28/2011
IR49-SS12-11A	0-1	3/28/2011
IR49-SS12D-11B	0-1	4/18/2011
IR49-SS13-11A	0-1	3/28/2011
IR49-SS13-11B	0-1	4/18/2011
Subsurface Soils		
IR49-SB09-3-4-11A	3-4	3/31/2011
IR49-SB10-3-4-11A	3-4	3/31/2011
IR49-SB11-2-3-11A	2-3	3/31/2011
IR49-SB12-1.5-2-11A	1.5-2	3/31/2011
IR49-SB13-1.5-2-11A	1.5-2	3/31/2011
IR49-SB13D-1.5-2-11A	1.5-2	4/1/2011
IR49-SB14-0.5-1-11A	0.5-1	3/31/2011
Groundwater		
IR49-GW01-11A	NA	4/1/2011
IR49-GW02-11A	NA	4/1/2011
IR49-GW03-11A	NA	4/2/2011
IR49-GW04-11A	NA	4/1/2011
IR49-GW05-11A	NA	4/1/2011
IR49-GW06-11A	NA	4/1/2011
IR49-GW07-11A	NA	4/2/2011
IR49-GW07D-11A	NA	4/2/2011
IR49-TW01-09C	NA	7/12/2009
IR49-TW01D-09C	NA	7/12/2009
IR49-TW01R-10A	NA	2/18/2010
IR49-TW04-10A	NA	2/18/2010

TABLE G-2

Samples Used in the Ecological Risk Assessment (ERA) for Site 49

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Sample ID	Sample Depth (ft bgs)	Date
IR49-TW05-10A	NA	2/18/2010
IR49-TW06-10A	NA	2/18/2010
IR49-TW07-10A	NA	2/18/2010
IR49-TW08-10A	NA	2/18/2010
Groundwater, cont.		
IR49-GW08-11A	NA	4/2/2011
Surface Water		
IR49-SW02-11A	NA	3/29/2011
IR49-SW02D-11A	NA	3/29/2011
IR49-SW03-11A	NA	3/29/2011
Sediment		
IR49-SD02-11A	NA	3/29/2011
IR49-SD02D-11A	NA	3/29/2011
IR49-SD03-11A	NA	3/29/2011
IR49-SD04-11A	NA	3/30/2011
IR49-SD04-11B	NA	4/18/2011
IR49-SD05-11A	NA	3/30/2011
IR49-SD06-11A	NA	3/30/2011
IR49-SD06-11B	NA	4/18/2011
Pore Water		
IR49-PW01-11A	NA	4/2/2011
IR49-PW02-11A	NA	4/1/2011
IR49-PW02D-11A	NA	4/1/2011
IR49-PW03-11A	NA	4/1/2011

Notes:

ft bgs - feet below ground surface

NA - not applicable

Generated by: Sara Kent/ATL

Checked by: Rachel Zajac/RDU

TABLE G-3
Site 49 Surface Soil Screen - Step 2
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient	Step 2 COPC? [2]	
Volatile Organic Compounds (UG/KG)									
1,1,1-Trichloroethane	0.49 - 210	0 / 13	--	--	100	-- / --	2.10	Yes	(2) Not detected, HQ above one
1,1,2,2-Tetrachloroethane	0.50 - 410	1 / 13	0.86	IR49-SS07-11A	100	0 / 13	0.0086	No	HQ less than one, detected
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	0.49 - 210	0 / 13	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
1,1,2-Trichloroethane	0.49 - 210	0 / 13	--	--	100	-- / --	2.10	Yes	(2) Not detected, HQ above one
1,1-Dichloroethane	0.25 - 100	0 / 13	--	--	100	-- / --	1.00	No	HQ equals one, not detected
1,1-Dichloroethene	0.49 - 210	0 / 13	--	--	100	-- / --	2.10	Yes	(2) Not detected, HQ above one
1,2,4-Trichlorobenzene	0.49 - 210	0 / 13	--	--	10.0	-- / --	21.0	Yes	(2) Not detected, HQ above one
1,2-Dibromo-3-chloropropane	0.49 - 210	0 / 13	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
1,2-Dibromoethane	0.49 - 210	0 / 13	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
1,2-Dichlorobenzene	0.49 - 100	0 / 13	--	--	10.0	-- / --	10.0	Yes	(2) Not detected, HQ above one
1,2-Dichloroethane	0.49 - 100	0 / 13	--	--	400	-- / --	0.25	No	HQ less than one, not detected
1,2-Dichloropropane	0.49 - 210	0 / 13	--	--	700,000	-- / --	3.00E-04	No	HQ less than one, not detected
1,3-Dichlorobenzene	0.25 - 100	0 / 13	--	--	10.0	-- / --	10.0	Yes	(2) Not detected, HQ above one
1,4-Dichlorobenzene	0.25 - 210	0 / 13	--	--	10.0	-- / --	21.0	Yes	(2) Not detected, HQ above one
2-Butanone	57.0 - 410	2 / 12	15.0	IR49-SS07-11A	NSV	-- / --	NSV	Yes	(3) Detected, no screening value
2-Hexanone	0.49 - 210	0 / 13	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
4-Methyl-2-pentanone	0.49 - 210	0 / 13	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Acetone	110 - 810	3 / 13	220	IR49-SS07-11A	NSV	-- / --	NSV	Yes	(3) Detected, no screening value
Benzene	0.50 - 210	1 / 13	1.90	IR49-SS07-11A	50.0	0 / 13	0.038	No	HQ less than one, detected
Bromodichloromethane	0.49 - 100	0 / 13	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Bromoform	0.25 - 210	0 / 13	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Bromomethane	0.49 - 410	0 / 13	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Carbon disulfide	14.0 - 58.0	7 / 13	45.0	IR49-SS12-11A	NSV	-- / --	NSV	Yes	(3) Detected, no screening value
Carbon tetrachloride	0.25 - 100	0 / 13	--	--	1,000,000	-- / --	1.00E-04	No	HQ less than one, not detected
Chlorobenzene	0.25 - 210	0 / 13	--	--	50.0	-- / --	4.20	Yes	(2) Not detected, HQ above one
Chloroethane	0.49 - 210	0 / 13	--	--	100	-- / --	2.10	Yes	(2) Not detected, HQ above one
Chloroform	0.25 - 210	0 / 13	--	--	1.00	-- / --	210	Yes	(2) Not detected, HQ above one
Chloromethane	0.49 - 210	0 / 13	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
cis-1,2-Dichloroethene	0.25 - 210	0 / 13	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
cis-1,3-Dichloropropene	0.25 - 210	0 / 13	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Cyclohexane	0.50 - 210	1 / 13	0.98	IR49-SS07-11A	100	0 / 13	0.0098	No	HQ less than one, detected
Dibromochloromethane	0.49 - 210	0 / 13	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Dichlorodifluoromethane (Freon-12)	0.49 - 210	0 / 13	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Ethylbenzene	0.50 - 210	1 / 13	2.70	IR49-SS07-11A	50.0	0 / 13	0.054	No	HQ less than one, detected
Isopropylbenzene	0.25 - 210	0 / 13	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Methyl acetate	0.49 - 330	10 / 13	5,000	IR49-SS12-11A	NSV	-- / --	NSV	Yes	(3) Detected, no screening value
Methylcyclohexane	0.50 - 100	1 / 13	1.10	IR49-SS07-11A	NSV	-- / --	NSV	Yes	(3) Detected, no screening value
Methylene chloride	0.77 - 120	2 / 13	91.0	IR49-SS12-11B	2,000	0 / 13	0.046	No	HQ less than one, detected

TABLE G-3
Site 49 Surface Soil Screen - Step 2
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient	Step 2 COPC? [2]	
Methyl-tert-butyl ether (MTBE)	0.49 - 210	0 / 13	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Styrene	0.25 - 210	0 / 13	--	--	100	-- / --	2.10	Yes	(2) Not detected, HQ above one
Tetrachloroethene	0.49 - 100	0 / 13	--	--	10.0	-- / --	10.0	Yes	(2) Not detected, HQ above one
Toluene	0.77 - 210	2 / 13	3.00	IR49-SS07-11A	50.0	0 / 13	0.060	No	HQ less than one, detected
trans-1,2-Dichloroethene	0.25 - 100	0 / 13	--	--	100	-- / --	1.00	No	HQ equals one, not detected
trans-1,3-Dichloropropene	0.49 - 100	0 / 13	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Trichloroethene	0.39 - 210	2 / 13	4.70	IR49-SS07-11A	1.00	2 / 13	4.70	Yes	(1) HQ above one, detected
Trichlorofluoromethane (Freon-11)	0.25 - 210	1 / 13	39.0	IR49-SS03-11A	NSV	-- / --	NSV	Yes	(3) Detected, no screening value
Vinyl chloride	0.25 - 210	0 / 13	--	--	10.0	-- / --	21.0	Yes	(2) Not detected, HQ above one
Xylene, total	0.74 - 410	0 / 13	--	--	50.0	-- / --	8.20	Yes	(2) Not detected, HQ above one

NOTES
1 - Count of detected samples exceeding or equaling Screening Value
2 - Categories are assigned to analytes retained as Step 2 COPCs as follows:
Category 1 – Contaminants with a maximum detection exceeding the ESV
Category 2– Undetected contaminants with a laboratory sample quantitation limit (SQL) exceeding the ESV
Category 3 – Detected contaminants with no ESV
Category 4 – Undetected contaminants with no ESV
COPC - Contaminant of Potential Concern
ESV - Ecological Screening Value
HQ - Hazard Quotient
NSV - No Screening Value
μg/kg - micrograms per kilogram
Generated by: Sara Kent/ATL
Checked by: Rachel Zajac/RDU

TABLE G-4
Site 49 Subsurface Soil Screen - Step 2
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient	Step 2 COPC? [2]	
Volatile Organic Compounds (UG/KG)									
1,1,1-Trichloroethane	0.42 - 30.0	0 / 6	--	--	100	-- / --	0.30	No	HQ less than one, not detected
1,1,2,2-Tetrachloroethane	0.42 - 59.0	2 / 6	2.10	IR49-SB09-3-4-11A	100	0 / 6	0.021	No	HQ less than one, detected
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	0.42 - 30.0	0 / 6	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
1,1,2-Trichloroethane	0.42 - 30.0	1 / 6	1.90	IR49-SB09-3-4-11A	100	0 / 6	0.019	No	HQ less than one, detected
1,1-Dichloroethane	0.21 - 15.0	0 / 6	--	--	100	-- / --	0.15	No	HQ less than one, not detected
1,1-Dichloroethene	0.42 - 30.0	0 / 6	--	--	100	-- / --	0.30	No	HQ less than one, not detected
1,2,4-Trichlorobenzene	0.42 - 30.0	0 / 6	--	--	10.0	-- / --	3.00	Yes	(2) Not detected, HQ above one
1,2-Dibromo-3-chloropropane	0.42 - 30.0	0 / 6	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
1,2-Dibromoethane	0.42 - 30.0	0 / 6	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
1,2-Dichlorobenzene	0.42 - 15.0	0 / 6	--	--	10.0	-- / --	1.50	Yes	(2) Not detected, HQ above one
1,2-Dichloroethane	0.42 - 15.0	0 / 6	--	--	400	-- / --	0.038	No	HQ less than one, not detected
1,2-Dichloropropane	0.42 - 30.0	0 / 6	--	--	700,000	-- / --	4.29E-05	No	HQ less than one, not detected
1,3-Dichlorobenzene	0.21 - 15.0	0 / 6	--	--	10.0	-- / --	1.50	Yes	(2) Not detected, HQ above one
1,4-Dichlorobenzene	0.21 - 30.0	0 / 6	--	--	10.0	-- / --	3.00	Yes	(2) Not detected, HQ above one
2-Butanone	-- - --	3 / 3	56.0	IR49-SB13-1_5-2-11A	NSV	-- / --	NSV	Yes	(3) Detected, no screening value
2-Hexanone	0.42 - 30.0	0 / 6	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
4-Methyl-2-pentanone	0.42 - 30.0	0 / 6	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Acetone	-- - --	3 / 3	48.0	IR49-SB14-0_5-1-11A	NSV	-- / --	NSV	Yes	(3) Detected, no screening value
Benzene	0.42 - 0.53	1 / 6	1.80	IR49-SB13-1_5-2-11A	50.0	0 / 6	0.036	No	HQ less than one, detected
Bromodichloromethane	0.42 - 15.0	0 / 6	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Bromoform	0.21 - 30.0	0 / 6	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Bromomethane	0.42 - 59.0	0 / 6	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Carbon disulfide	-- - --	6 / 6	7.10	IR49-SB13-1_5-2-11A	NSV	-- / --	NSV	Yes	(3) Detected, no screening value
Carbon tetrachloride	0.21 - 15.0	0 / 6	--	--	1,000,000	-- / --	1.50E-05	No	HQ less than one, not detected
Chlorobenzene	0.21 - 30.0	0 / 6	--	--	50.0	-- / --	0.60	No	HQ less than one, not detected
Chloroethane	0.42 - 30.0	0 / 6	--	--	100	-- / --	0.30	No	HQ less than one, not detected
Chloroform	0.21 - 30.0	0 / 6	--	--	1.00	-- / --	30.0	Yes	(2) Not detected, HQ above one
Chloromethane	0.42 - 30.0	0 / 6	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
cis-1,2-Dichloroethene	0.21 - 30.0	0 / 6	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
cis-1,3-Dichloropropene	0.21 - 30.0	0 / 6	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Cyclohexane	0.42 - 0.53	1 / 6	0.63	IR49-SB13-1_5-2-11A	100	0 / 6	0.0063	No	HQ less than one, detected
Dibromochloromethane	0.42 - 30.0	0 / 6	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Dichlorodifluoromethane (Freon-12)	0.42 - 30.0	0 / 6	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Ethylbenzene	0.42 - 0.53	1 / 6	3.30	IR49-SB13-1_5-2-11A	50.0	0 / 6	0.066	No	HQ less than one, detected
Isopropylbenzene	0.21 - 30.0	0 / 6	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Methyl acetate	0.42 - 0.53	1 / 6	120	IR49-SB13-1_5-2-11A	NSV	-- / --	NSV	Yes	(3) Detected, no screening value
Methylcyclohexane	0.42 - 0.53	1 / 6	1.00	IR49-SB13-1_5-2-11A	NSV	-- / --	NSV	Yes	(3) Detected, no screening value
Methylene chloride	1.70 - 15.0	0 / 6	--	--	2,000	-- / --	0.0075	No	HQ less than one, not detected
Methyl-tert-butyl ether (MTBE)	0.42 - 30.0	0 / 6	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Styrene	0.21 - 30.0	0 / 6	--	--	100	-- / --	0.30	No	HQ less than one, not detected
Tetrachloroethene	0.42 - 15.0	0 / 6	--	--	10.0	-- / --	1.50	Yes	(2) Not detected, HQ above one

TABLE G-4
Site 49 Subsurface Soil Screen - Step 2
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient	Step 2 COPC? [2]	
Toluene	0.42 - 0.53	2 / 6	3.10	IR49-SB13-1_5-2-11A	50.0	0 / 6	0.062	No	HQ less than one, detected
trans-1,2-Dichloroethene	0.21 - 15.0	0 / 6	--	--	100	-- / --	0.15	No	HQ less than one, not detected
trans-1,3-Dichloropropene	0.42 - 15.0	0 / 6	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Trichloroethene	0.21 - 30.0	0 / 6	--	--	1.00	-- / --	30.0	Yes	(2) Not detected, HQ above one
Trichlorofluoromethane (Freon-11)	0.21 - 30.0	0 / 6	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Vinyl chloride	0.21 - 30.0	0 / 6	--	--	10.0	-- / --	3.00	Yes	(2) Not detected, HQ above one
Xylene, total	0.62 - 59.0	0 / 6	--	--	50.0	-- / --	1.18	Yes	(2) Not detected, HQ above one

NOTES
1 - Count of detected samples exceeding or equaling Screening Value
2 - Categories are assigned to analytes retained as Step 2 COPCs as follows:
Category 1 – Contaminants with a maximum detection exceeding the ESV
Category 2– Undetected contaminants with a laboratory sample quantitation limit (SQL) exceeding the ESV
Category 3 – Detected contaminants with no ESV
Category 4 – Undetected contaminants with no ESV
COPC - Contaminant of Potential Concern
ESV - Ecological Screening Value
HQ - Hazard Quotient
NSV - No Screening Value
µg/kg - micrograms per kilogram
Generated by: Sara Kent/ATL
Checked by: Rachel Zajac/RDU

TABLE G-5
Site 49 Groundwater Screen - Step 2
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Screening Value[1]	Frequency of Exceedance[2]	Maximum Hazard Quotient	Step 2 COPC? [3]	
Volatile Organic Compounds (UG/L)									
1,1,1-Trichloroethane	0.50 - 1.00	0 / 15	--	--	312	-- / --	0.0032	No	HQ less than one, not detected
1,1,2,2-Tetrachloroethane	0.50 - 1.00	5 / 15	78.5	IR49-TW07-10A	90.2	0 / 15	0.87	No	HQ less than one, detected
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	0.50 - 1.00	0 / 15	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
1,1,2-Trichloroethane	0.50 - 1.00	5 / 15	6.02	IR49-TW07-10A	NSV	-- / --	NSV	Yes	(3) Detected, no screening value
1,1-Dichloroethane	0.50 - 1.00	0 / 15	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
1,1-Dichloroethene	0.50 - 1.00	3 / 15	0.99	IR49-TW07-10A	2,240	0 / 15	4.43E-04	No	HQ less than one, detected
1,2,4-Trichlorobenzene	0.50 - 1.00	0 / 15	--	--	4.50	-- / --	0.22	No	HQ less than one, not detected
1,2-Dibromo-3-chloropropane	0.50 - 1.50	0 / 15	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
1,2-Dibromoethane	0.25 - 1.00	0 / 15	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
1,2-Dichlorobenzene	0.50 - 1.00	0 / 15	--	--	19.7	-- / --	0.051	No	HQ less than one, not detected
1,2-Dichloroethane	0.50 - 1.00	4 / 15	0.62	IR49-TW06-10A	1,130	0 / 15	5.49E-04	No	HQ less than one, detected
1,2-Dichloropropane	0.50 - 1.00	0 / 15	--	--	2,400	-- / --	4.17E-04	No	HQ less than one, not detected
1,3-Dichlorobenzene	0.25 - 1.00	0 / 15	--	--	28.5	-- / --	0.035	No	HQ less than one, not detected
1,4-Dichlorobenzene	0.50 - 1.00	3 / 15	0.30	IR49-TW05-10A	19.9	0 / 15	0.015	No	HQ less than one, detected
2-Butanone	0.50 - 5.00	0 / 15	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
2-Hexanone	0.50 - 5.00	0 / 15	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
4-Methyl-2-pentanone	0.50 - 5.00	0 / 15	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Acetone	1.80 - 5.50	3 / 15	6.07	IR49-TW08-10A	NSV	-- / --	NSV	Yes	(3) Detected, no screening value
Benzene	0.50 - 1.00	4 / 15	2.47	IR49-TW07-10A	109	0 / 15	0.023	No	HQ less than one, detected
Bromodichloromethane	0.50 - 1.00	0 / 15	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Bromoform	0.25 - 1.50	0 / 15	--	--	640	-- / --	0.0023	No	HQ less than one, not detected
Bromomethane	0.50 - 1.00	0 / 15	--	--	120	-- / --	0.0083	No	HQ less than one, not detected
Carbon disulfide	0.50 - 1.00	1 / 15	0.21	IR49-TW01-09C	NSV	-- / --	NSV	Yes	(3) Detected, no screening value
Carbon tetrachloride	0.50 - 1.00	0 / 15	--	--	1,500	-- / --	6.67E-04	No	HQ less than one, not detected
Chlorobenzene	0.50 - 1.00	0 / 15	--	--	105	-- / --	0.0095	No	HQ less than one, not detected
Chloroethane	0.50 - 1.00	0 / 15	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Chloroform	0.50 - 1.00	5 / 15	0.55	IR49-GW03-11A	815	0 / 15	6.75E-04	No	HQ less than one, detected
Chloromethane	0.50 - 1.00	0 / 15	--	--	2,700	-- / --	3.70E-04	No	HQ less than one, not detected
cis-1,2-Dichloroethene	0.50 - 0.50	13 / 15	155	IR49-TW07-10A	NSV	-- / --	NSV	Yes	(3) Detected, no screening value
cis-1,3-Dichloropropene	0.10 - 1.00	0 / 15	--	--	7.90	-- / --	0.13	No	HQ less than one, not detected
Cyclohexane	0.50 - 1.00	3 / 15	3.54	IR49-TW07-10A	NSV	-- / --	NSV	Yes	(3) Detected, no screening value
Dibromochloromethane	0.25 - 1.00	0 / 15	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Dichlorodifluoromethane (Freon-12)	0.50 - 1.00	0 / 15	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Ethylbenzene	0.25 - 1.00	3 / 15	0.18	IR49-TW07-10A	4.30	0 / 15	0.042	No	HQ less than one, detected
Isopropylbenzene	0.50 - 1.00	4 / 15	0.52	IR49-TW07-10A	NSV	-- / --	NSV	Yes	(3) Detected, no screening value
Methyl acetate	0.50 - 2.00	0 / 15	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Methylcyclohexane	0.50 - 1.00	3 / 15	5.86	IR49-TW07-10A	NSV	-- / --	NSV	Yes	(3) Detected, no screening value
Methylene chloride	0.50 - 1.00	0 / 15	--	--	2,560	-- / --	3.91E-04	No	HQ less than one, not detected
Methyl-tert-butyl ether (MTBE)	0.50 - 1.00	0 / 15	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Styrene	0.10 - 1.00	0 / 15	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Tetrachloroethene	0.50 - 1.00	3 / 15	1.33	IR49-TW07-10A	45.0	0 / 15	0.030	No	HQ less than one, detected

TABLE G-5
Site 49 Groundwater Screen - Step 2
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Screening Value[1]	Frequency of Exceedance[2]	Maximum Hazard Quotient	Step 2 COPC? [3]	
Toluene	0.10 - 1.00	2 / 15	0.28	IR49-GW01-11A	37.0	0 / 15	0.0076	No	HQ less than one, detected
trans-1,2-Dichloroethene	0.50 - 0.50	8 / 15	108	IR49-TW07-10A	NSV	-- / --	NSV	Yes	(3) Detected, no screening value
trans-1,3-Dichloropropene	0.25 - 1.00	0 / 15	--	--	7.90	-- / --	0.13	No	HQ less than one, not detected
Trichloroethene	0.50 - 1.50	6 / 15	276	IR49-TW07-10A	NSV	-- / --	NSV	Yes	(3) Detected, no screening value
Trichlorofluoromethane (Freon-11)	0.50 - 1.00	0 / 15	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Vinyl chloride	0.50 - 1.00	6 / 15	22.1	IR49-TW06-10A	NSV	-- / --	NSV	Yes	(3) Detected, no screening value
Xylene, total	0.75 - 2.41	0 / 15	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Semivolatile Organic Compounds (UG/L)									
1,1-Biphenyl	9.80 - 9.80	0 / 1	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
2,2'-Oxybis(1-chloropropane)	9.80 - 9.80	0 / 1	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
2,4,5-Trichlorophenol	24.0 - 24.0	0 / 1	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
2,4,6-Trichlorophenol	9.80 - 9.80	0 / 1	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
2,4-Dichlorophenol	9.80 - 9.80	0 / 1	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
2,4-Dimethylphenol	9.80 - 9.80	0 / 1	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
2,4-Dinitrophenol	24.0 - 24.0	0 / 1	--	--	48.5	-- / --	0.49	No	HQ less than one, not detected
2,4-Dinitrotoluene	9.80 - 9.80	0 / 1	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
2,6-Dinitrotoluene	9.80 - 9.80	0 / 1	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
2-Chloronaphthalene	9.80 - 9.80	0 / 1	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
2-Chlorophenol	9.80 - 9.80	0 / 1	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
2-Methylnaphthalene	9.80 - 9.80	0 / 1	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
2-Methylphenol	9.80 - 9.80	0 / 1	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
2-Nitroaniline	24.0 - 24.0	0 / 1	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
2-Nitrophenol	9.80 - 9.80	0 / 1	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
3,3'-Dichlorobenzidine	9.80 - 9.80	0 / 1	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
3-Nitroaniline	24.0 - 24.0	0 / 1	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
4,6-Dinitro-2-methylphenol	24.0 - 24.0	0 / 1	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
4-Bromophenyl-phenylether	9.80 - 9.80	0 / 1	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
4-Chloro-3-methylphenol	9.80 - 9.80	0 / 1	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
4-Chloroaniline	9.80 - 9.80	0 / 1	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
4-Chlorophenyl-phenylether	9.80 - 9.80	0 / 1	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
4-Methylphenol	9.80 - 9.80	0 / 1	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
4-Nitroaniline	24.0 - 24.0	0 / 1	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
4-Nitrophenol	24.0 - 24.0	0 / 1	--	--	71.7	-- / --	0.33	No	HQ less than one, not detected
Acenaphthene	9.80 - 9.80	0 / 1	--	--	9.70	-- / --	1.01	No	HQ less than one, not detected
Acenaphthylene	9.80 - 9.80	0 / 1	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Acetophenone	9.80 - 9.80	0 / 1	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Anthracene	9.80 - 9.80	0 / 1	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Atrazine	9.80 - 9.80	0 / 1	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Benzaldehyde	9.80 - 9.80	0 / 1	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Benzo(a)anthracene	9.80 - 9.80	0 / 1	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Benzo(a)pyrene	9.80 - 9.80	0 / 1	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Benzo(b)fluoranthene	9.80 - 9.80	0 / 1	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value

TABLE G-5
Site 49 Groundwater Screen - Step 2
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Screening Value[1]	Frequency of Exceedance[2]	Maximum Hazard Quotient	Step 2 COPC? [3]	
Benzo(g,h,i)perylene	9.80 - 9.80	0 / 1	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Benzo(k)fluoranthene	9.80 - 9.80	0 / 1	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
bis(2-Chloroethoxy)methane	9.80 - 9.80	0 / 1	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
bis(2-Chloroethyl)ether	9.80 - 9.80	0 / 1	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
bis(2-Ethylhexyl)phthalate	9.80 - 9.80	0 / 1	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Butylbenzylphthalate	9.80 - 9.80	0 / 1	--	--	29.4	-- / --	0.33	No	HQ less than one, not detected
Caprolactam	9.80 - 9.80	0 / 1	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Carbazole	9.80 - 9.80	0 / 1	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Chrysene	9.80 - 9.80	0 / 1	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Dibenz(a,h)anthracene	9.80 - 9.80	0 / 1	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Dibenzofuran	9.80 - 9.80	0 / 1	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Diethylphthalate	9.80 - 9.80	0 / 1	--	--	759	-- / --	0.013	No	HQ less than one, not detected
Dimethyl phthalate	9.80 - 9.80	0 / 1	--	--	580	-- / --	0.017	No	HQ less than one, not detected
Di-n-butylphthalate	9.80 - 9.80	0 / 1	--	--	3.40	-- / --	2.88	Yes	(2) Not detected, HQ above one
Di-n-octylphthalate	9.80 - 9.80	0 / 1	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Fluoranthene	9.80 - 9.80	0 / 1	--	--	1.60	-- / --	6.13	Yes	(2) Not detected, HQ above one
Fluorene	9.80 - 9.80	0 / 1	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Hexachlorobenzene	9.80 - 9.80	0 / 1	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Hexachlorobutadiene	9.80 - 9.80	0 / 1	--	--	0.32	-- / --	30.6	Yes	(2) Not detected, HQ above one
Hexachlorocyclopentadiene	9.80 - 9.80	0 / 1	--	--	0.070	-- / --	140	Yes	(2) Not detected, HQ above one
Hexachloroethane	9.80 - 9.80	0 / 1	--	--	9.40	-- / --	1.04	Yes	(2) Not detected, HQ above one
Indeno(1,2,3-cd)pyrene	9.80 - 9.80	0 / 1	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Isophorone	9.80 - 9.80	0 / 1	--	--	129	-- / --	0.076	No	HQ less than one, not detected
Naphthalene	9.80 - 9.80	0 / 1	--	--	23.5	-- / --	0.42	No	HQ less than one, not detected
n-Nitroso-di-n-propylamine	9.80 - 9.80	0 / 1	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
n-Nitrosodiphenylamine	9.80 - 9.80	0 / 1	--	--	33,000	-- / --	2.97E-04	No	HQ less than one, not detected
Nitrobenzene	9.80 - 9.80	0 / 1	--	--	66.8	-- / --	0.15	No	HQ less than one, not detected
Pentachlorophenol	24.0 - 24.0	0 / 1	--	--	7.90	-- / --	3.04	Yes	(2) Not detected, HQ above one
Phenanthrene	9.80 - 9.80	0 / 1	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Phenol	9.80 - 9.80	0 / 1	--	--	58.0	-- / --	0.17	No	HQ less than one, not detected
Pyrene	9.80 - 9.80	0 / 1	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Inorganics (UG/L)									
Aluminum	-- - --	1 / 1	1,130	IR49-TW01-09C	NSV	-- / --	NSV	Yes	(3) Detected, no screening value
Antimony	15.0 - 15.0	0 / 1	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Arsenic	10.0 - 10.0	0 / 1	--	--	36.0	-- / --	0.28	No	HQ less than one, not detected
Barium	-- - --	1 / 1	38.8	IR49-TW01-09C	NSV	-- / --	NSV	Yes	(3) Detected, no screening value
Beryllium	5.00 - 5.00	0 / 1	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Cadmium	5.00 - 5.00	0 / 1	--	--	8.80	-- / --	0.57	No	HQ less than one, not detected
Calcium [4]	-- - --	1 / 1	12,300	IR49-TW01-09C	NSV	-- / --	NSV	Yes	(3) Detected, no screening value
Chromium	-- - --	1 / 1	2.50	IR49-TW01-09C	50.0	0 / 1	0.050	No	HQ less than one, detected
Cobalt	15.0 - 15.0	0 / 1	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Copper	10.0 - 10.0	0 / 1	--	--	3.10	-- / --	3.23	Yes	(2) Not detected, HQ above one

TABLE G-5

Site 49 Groundwater Screen - Step 2

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Screening Value[1]	Frequency of Exceedance[2]	Maximum Hazard Quotient	Step 2 COPC? [3]	
Iron	-- - --	1 / 1	4,040	IR49-TW01-09C	NSV	-- / --	NSV	Yes	(3) Detected, no screening value
Lead	3.00 - 3.00	0 / 1	--	--	8.10	-- / --	0.37	No	HQ less than one, not detected
Magnesium [4]	-- - --	1 / 1	2,040	IR49-TW01-09C	NSV	-- / --	NSV	Yes	(3) Detected, no screening value
Manganese	-- - --	1 / 1	51.7	IR49-TW01-09C	NSV	-- / --	NSV	Yes	(3) Detected, no screening value
Mercury	0.20 - 0.20	0 / 1	--	--	0.94	-- / --	0.21	No	HQ less than one, not detected
Nickel	-- - --	1 / 1	14.2	IR49-TW01-09C	8.20	1 / 1	1.73	Yes	(1) HQ above one, detected
Potassium [4]	-- - --	1 / 1	1,070	IR49-TW01-09C	NSV	-- / --	NSV	Yes	(3) Detected, no screening value
Selenium	5.00 - 5.00	0 / 1	--	--	71.0	-- / --	0.070	No	HQ less than one, not detected
Silver	10.0 - 10.0	0 / 1	--	--	0.23	-- / --	43.5	Yes	(2) Not detected, HQ above one
Sodium [4]	-- - --	1 / 1	31,500	IR49-TW01-09C	NSV	-- / --	NSV	Yes	(3) Detected, no screening value
Thallium	2.00 - 2.00	0 / 1	--	--	21.3	-- / --	0.094	No	HQ less than one, not detected
Vanadium	15.0 - 15.0	0 / 1	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Zinc	-- - --	1 / 1	11.0	IR49-TW01-09C	81.0	0 / 1	0.14	No	HQ less than one, detected

NOTES

1 - Marine Screening Values

2 - Count of detected samples exceeding or equaling Screening Value

3 - Categories are assigned to analytes retained as Step 2 COPCs as follows:

Category 1 – Contaminants with a maximum detection exceeding the ESV

Category 2– Undetected contaminants with a laboratory sample quantitation limit (SQL) exceeding the ESV

Category 3 – Detected contaminants with no ESV

Category 4 – Undetected contaminants with no ESV

4 - Macronutrients

COPC - Contaminant of Potential Concern

ESV - Ecological Screening Value

HQ - Hazard Quotient

NSV - No Screening Value

μg/L - micrograms per liter

Generated by: Sara Kent/ATL

Checked by: Rachel Zajac/RDU

TABLE G-6
Site 49 Surface Water Screen - Step 2
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Screening Value[1]	Frequency of Exceedance[2]	Maximum Hazard Quotient	Step 2 COPC? [3]	
Volatile Organic Compounds (UG/L)									
1,1,1-Trichloroethane	0.50 - 0.50	0 / 2	--	--	312	-- / --	0.0016	No	HQ less than one, not detected
1,1,2,2-Tetrachloroethane	0.50 - 0.50	0 / 2	--	--	90.2	-- / --	0.0055	No	HQ less than one, not detected
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	0.50 - 0.50	0 / 2	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
1,1,2-Trichloroethane	0.50 - 0.50	0 / 2	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
1,1-Dichloroethane	0.50 - 0.50	0 / 2	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
1,1-Dichloroethene	0.50 - 0.50	0 / 2	--	--	2,240	-- / --	2.23E-04	No	HQ less than one, not detected
1,2,4-Trichlorobenzene	0.50 - 0.50	0 / 2	--	--	4.50	-- / --	0.11	No	HQ less than one, not detected
1,2-Dibromo-3-chloropropane	0.50 - 0.50	0 / 2	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
1,2-Dibromoethane	0.25 - 0.25	0 / 2	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
1,2-Dichlorobenzene	0.50 - 0.50	0 / 2	--	--	19.7	-- / --	0.025	No	HQ less than one, not detected
1,2-Dichloroethane	0.50 - 0.50	0 / 2	--	--	1,130	-- / --	4.42E-04	No	HQ less than one, not detected
1,2-Dichloropropane	0.50 - 0.50	0 / 2	--	--	2,400	-- / --	2.08E-04	No	HQ less than one, not detected
1,3-Dichlorobenzene	0.25 - 0.25	0 / 2	--	--	28.5	-- / --	0.0088	No	HQ less than one, not detected
1,4-Dichlorobenzene	0.50 - 0.50	0 / 2	--	--	19.9	-- / --	0.025	No	HQ less than one, not detected
2-Butanone	0.50 - 0.50	0 / 2	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
2-Hexanone	0.50 - 0.50	0 / 2	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
4-Methyl-2-pentanone	0.50 - 0.50	0 / 2	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Acetone	6.30 - 6.90	0 / 2	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Benzene	0.50 - 0.50	0 / 2	--	--	109	-- / --	0.0046	No	HQ less than one, not detected
Bromodichloromethane	0.50 - 0.50	0 / 2	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Bromoform	0.25 - 0.25	0 / 2	--	--	640	-- / --	3.91E-04	No	HQ less than one, not detected
Bromomethane	0.50 - 0.50	0 / 2	--	--	120	-- / --	0.0042	No	HQ less than one, not detected
Carbon disulfide	0.50 - 0.50	0 / 2	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Carbon tetrachloride	0.50 - 0.50	0 / 2	--	--	1,500	-- / --	3.33E-04	No	HQ less than one, not detected
Chlorobenzene	0.50 - 0.50	0 / 2	--	--	105	-- / --	0.0048	No	HQ less than one, not detected
Chloroethane	0.50 - 0.50	0 / 2	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Chloroform	0.50 - 0.50	0 / 2	--	--	815	-- / --	6.13E-04	No	HQ less than one, not detected
Chloromethane	0.50 - 0.50	0 / 2	--	--	2,700	-- / --	1.85E-04	No	HQ less than one, not detected
cis-1,2-Dichloroethene	0.50 - 0.50	0 / 2	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
cis-1,3-Dichloropropene	0.10 - 0.10	0 / 2	--	--	7.90	-- / --	0.013	No	HQ less than one, not detected
Cyclohexane	0.50 - 0.50	0 / 2	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Dibromochloromethane	0.25 - 0.25	0 / 2	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Dichlorodifluoromethane (Freon-12)	0.50 - 0.50	0 / 2	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Ethylbenzene	0.25 - 0.25	0 / 2	--	--	4.30	-- / --	0.058	No	HQ less than one, not detected
Isopropylbenzene	0.50 - 0.50	0 / 2	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Methyl acetate	0.50 - 0.50	0 / 2	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Methylcyclohexane	0.50 - 0.50	0 / 2	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Methylene chloride	0.50 - 0.50	0 / 2	--	--	2,560	-- / --	1.95E-04	No	HQ less than one, not detected
Methyl-tert-butyl ether (MTBE)	0.50 - 0.50	0 / 2	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Styrene	0.10 - 0.10	0 / 2	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value

TABLE G-6
Site 49 Surface Water Screen - Step 2
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Screening Value[1]	Frequency of Exceedance[2]	Maximum Hazard Quotient	Step 2 COPC? [3]	
Tetrachloroethene	0.50 - 0.50	0 / 2	--	--	45.0	-- / --	0.011	No	HQ less than one, not detected
Toluene	0.10 - 0.10	0 / 2	--	--	37.0	-- / --	0.0027	No	HQ less than one, not detected
trans-1,2-Dichloroethene	0.50 - 0.50	0 / 2	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
trans-1,3-Dichloropropene	0.25 - 0.25	0 / 2	--	--	7.90	-- / --	0.032	No	HQ less than one, not detected
Trichloroethene	0.50 - 0.50	0 / 2	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Trichlorofluoromethane (Freon-11)	0.50 - 0.50	0 / 2	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Vinyl chloride	0.50 - 0.50	0 / 2	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Xylene, total	0.75 - 0.75	0 / 2	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value

NOTES
1 - Marine Screening Values
2 - Count of detected samples exceeding or equaling Screening Value
3 - Categories are assigned to analytes retained as Step 2 COPCs as follows:
Category 1 – Contaminants with a maximum detection exceeding the ESV
Category 2– Undetected contaminants with a laboratory sample quantitation limit (SQL) exceeding the ESV
Category 3 – Detected contaminants with no ESV
Category 4 – Undetected contaminants with no ESV
COPC - Contaminant of Potential Concern
ESV - Ecological Screening Value
HQ - Hazard Quotient
NSV - No Screening Value
µg/L - micrograms per liter
Generated by: Sara Kent/ATL
Checked by: Rachel Zajac/RDU

TABLE G-7
Site 49 Sediment Screen - Step 2
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient	Step 2 COPC? [2]	
Volatile Organic Compounds (UG/KG)									
1,1,1-Trichloroethane	0.52 - 330	0 / 5	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
1,1,2,2-Tetrachloroethane	0.52 - 660	0 / 5	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	0.52 - 330	0 / 5	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
1,1,2-Trichloroethane	0.52 - 330	0 / 5	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
1,1-Dichloroethane	0.26 - 170	0 / 5	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
1,1-Dichloroethene	0.52 - 330	0 / 5	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
1,2,4-Trichlorobenzene	0.52 - 330	0 / 5	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
1,2-Dibromo-3-chloropropane	0.52 - 330	0 / 5	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
1,2-Dibromoethane	0.52 - 330	0 / 5	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
1,2-Dichlorobenzene	0.52 - 170	0 / 5	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
1,2-Dichloroethane	0.52 - 170	0 / 5	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
1,2-Dichloropropane	0.52 - 330	0 / 5	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
1,3-Dichlorobenzene	0.26 - 170	0 / 5	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
1,4-Dichlorobenzene	0.26 - 330	0 / 5	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
2-Butanone	110 - 660	2 / 5	57.0	IR49-SD03-11A	NSV	-- / --	NSV	Yes	(3) Detected, no screening value
2-Hexanone	0.52 - 330	0 / 5	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
4-Methyl-2-pentanone	0.52 - 330	0 / 5	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Acetone	210 - 1,400	1 / 5	28.0	IR49-SD04-11B	NSV	-- / --	NSV	Yes	(3) Detected, no screening value
Benzene	42.0 - 330	1 / 5	0.46	IR49-SD04-11B	NSV	-- / --	NSV	Yes	(3) Detected, no screening value
Bromodichloromethane	0.52 - 170	0 / 5	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Bromoform	0.26 - 330	0 / 5	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Bromomethane	0.52 - 660	0 / 5	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Carbon disulfide	27.0 - 27.0	4 / 5	93.0	IR49-SD02-11A	NSV	-- / --	NSV	Yes	(3) Detected, no screening value
Carbon tetrachloride	0.26 - 170	0 / 5	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Chlorobenzene	0.26 - 330	0 / 5	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Chloroethane	0.52 - 330	0 / 5	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Chloroform	0.26 - 330	0 / 5	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Chloromethane	0.52 - 330	0 / 5	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
cis-1,2-Dichloroethene	0.26 - 330	0 / 5	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
cis-1,3-Dichloropropene	0.26 - 330	0 / 5	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Cyclohexane	0.52 - 330	0 / 5	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Dibromochloromethane	0.52 - 330	0 / 5	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Dichlorodifluoromethane (Freon-12)	42.0 - 330	1 / 5	0.37	IR49-SD04-11B	NSV	-- / --	NSV	Yes	(3) Detected, no screening value
Ethylbenzene	42.0 - 330	1 / 5	0.31	IR49-SD04-11B	NSV	-- / --	NSV	Yes	(3) Detected, no screening value
Isopropylbenzene	0.26 - 330	0 / 5	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Methyl acetate	0.52 - 0.52	4 / 5	1,900	IR49-SD02-11A	NSV	-- / --	NSV	Yes	(3) Detected, no screening value
Methylcyclohexane	0.52 - 170	0 / 5	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Methylene chloride	22.0 - 170	1 / 5	0.54	IR49-SD04-11B	NSV	-- / --	NSV	Yes	(3) Detected, no screening value
Methyl-tert-butyl ether (MTBE)	0.52 - 330	0 / 5	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Styrene	0.26 - 330	0 / 5	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value

TABLE G-7
Site 49 Sediment Screen - Step 2
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient	Step 2 COPC? [2]	
Tetrachloroethene	0.52 - 170	0 / 5	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Toluene	42.0 - 330	1 / 5	0.60	IR49-SD04-11B	NSV	-- / --	NSV	Yes	(3) Detected, no screening value
trans-1,2-Dichloroethene	0.26 - 170	0 / 5	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
trans-1,3-Dichloropropene	0.52 - 170	0 / 5	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Trichloroethene	0.26 - 330	0 / 5	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Trichlorofluoromethane (Freon-11)	0.26 - 330	0 / 5	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Vinyl chloride	0.26 - 330	0 / 5	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Xylene, total	0.78 - 660	0 / 5	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value

NOTES
1 - Count of detected samples exceeding or equaling Screening Value
2 - Categories are assigned toanalytes retained as Step 2 COPCs as follows:
Category 1 – Contaminants with a maximum detection exceeding the ESV
Category 2– Undetected contaminants with a laboratory sample quantitation limit (SQL) exceeding the ESV
Category 3 – Detected contaminants with no ESV
Category 4 – Undetected contaminants with no ESV
COPC - Contaminant of Potential Concern
ESV - Ecological Screening Value
HQ - Hazard Quotient
NSV - No Screening Value
µg/kg - micrograms per kilogram
Generated by: Sara Kent/ATL
Checked by: Rachel Zajac/RDU

TABLE G-8
Site 49 Porewater Screen - Step 2
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Screening Value[1]	Frequency of Exceedance[2]	Maximum Hazard Quotient	Step 2 COPC? [3]	
Volatile Organic Compounds (UG/L)									
1,1,1-Trichloroethane	0.50 - 0.50	0 / 3	--	--	312	-- / --	0.0016	No	HQ less than one, not detected
1,1,2,2-Tetrachloroethane	0.50 - 0.50	1 / 3	0.19	IR49-PW01-11A	90.2	0 / 3	0.0021	No	HQ less than one, detected
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	0.50 - 0.50	0 / 3	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
1,1,2-Trichloroethane	0.50 - 0.50	0 / 3	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
1,1-Dichloroethane	0.50 - 0.50	0 / 3	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
1,1-Dichloroethene	0.50 - 0.50	0 / 3	--	--	2,240	-- / --	2.23E-04	No	HQ less than one, not detected
1,2,4-Trichlorobenzene	0.50 - 0.50	0 / 3	--	--	4.50	-- / --	0.11	No	HQ less than one, not detected
1,2-Dibromo-3-chloropropane	0.50 - 0.50	0 / 3	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
1,2-Dibromoethane	0.25 - 0.25	0 / 3	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
1,2-Dichlorobenzene	0.50 - 0.50	0 / 3	--	--	19.7	-- / --	0.025	No	HQ less than one, not detected
1,2-Dichloroethane	0.50 - 0.50	0 / 3	--	--	1,130	-- / --	4.42E-04	No	HQ less than one, not detected
1,2-Dichloropropane	0.50 - 0.50	0 / 3	--	--	2,400	-- / --	2.08E-04	No	HQ less than one, not detected
1,3-Dichlorobenzene	0.25 - 0.25	0 / 3	--	--	28.5	-- / --	0.0088	No	HQ less than one, not detected
1,4-Dichlorobenzene	0.50 - 0.50	0 / 3	--	--	19.9	-- / --	0.025	No	HQ less than one, not detected
2-Butanone	0.50 - 0.50	2 / 3	2.60	IR49-PW01-11A	NSV	-- / --	NSV	Yes	(3) Detected, no screening value
2-Hexanone	0.50 - 0.50	0 / 3	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
4-Methyl-2-pentanone	0.50 - 0.50	0 / 3	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Acetone	5.60 - 7.60	1 / 3	100	IR49-PW01-11A	NSV	-- / --	NSV	Yes	(3) Detected, no screening value
Benzene	0.50 - 0.50	0 / 3	--	--	109	-- / --	0.0046	No	HQ less than one, not detected
Bromodichloromethane	0.50 - 0.50	0 / 3	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Bromoform	0.25 - 0.25	0 / 3	--	--	640	-- / --	3.91E-04	No	HQ less than one, not detected
Bromomethane	0.50 - 0.50	0 / 3	--	--	120	-- / --	0.0042	No	HQ less than one, not detected
Carbon disulfide	0.50 - 0.50	2 / 3	0.39	IR49-PW01-11A	NSV	-- / --	NSV	Yes	(3) Detected, no screening value
Carbon tetrachloride	0.50 - 0.50	0 / 3	--	--	1,500	-- / --	3.33E-04	No	HQ less than one, not detected
Chlorobenzene	0.50 - 0.50	0 / 3	--	--	105	-- / --	0.0048	No	HQ less than one, not detected
Chloroethane	0.50 - 0.50	0 / 3	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Chloroform	0.50 - 0.50	0 / 3	--	--	815	-- / --	6.13E-04	No	HQ less than one, not detected
Chloromethane	0.50 - 0.50	0 / 3	--	--	2,700	-- / --	1.85E-04	No	HQ less than one, not detected
cis-1,2-Dichloroethene	0.50 - 0.50	1 / 3	2.50	IR49-PW01-11A	NSV	-- / --	NSV	Yes	(3) Detected, no screening value
cis-1,3-Dichloropropene	0.10 - 0.10	0 / 3	--	--	7.90	-- / --	0.013	No	HQ less than one, not detected
Cyclohexane	0.50 - 0.50	0 / 3	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Dibromochloromethane	0.25 - 0.25	0 / 3	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Dichlorodifluoromethane (Freon-12)	0.50 - 0.50	0 / 3	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Ethylbenzene	0.25 - 0.25	0 / 3	--	--	4.30	-- / --	0.058	No	HQ less than one, not detected
Isopropylbenzene	0.50 - 0.50	0 / 3	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Methyl acetate	0.50 - 0.50	2 / 3	0.97	IR49-PW01-11A	NSV	-- / --	NSV	Yes	(3) Detected, no screening value
Methylcyclohexane	0.50 - 0.50	0 / 3	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Methylene chloride	0.50 - 0.50	0 / 3	--	--	2,560	-- / --	1.95E-04	No	HQ less than one, not detected
Methyl-tert-butyl ether (MTBE)	0.50 - 0.50	0 / 3	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Styrene	0.10 - 0.10	0 / 3	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Tetrachloroethene	0.50 - 0.50	0 / 3	--	--	45.0	-- / --	0.011	No	HQ less than one, not detected

TABLE G-8
Site 49 Porewater Screen - Step 2
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Screening Value[1]	Frequency of Exceedance[2]	Maximum Hazard Quotient	Step 2 COPC? [3]	
Toluene	0.10 - 0.10	0 / 3	--	--	37.0	-- / --	0.0027	No	HQ less than one, not detected
trans-1,2-Dichloroethene	0.50 - 0.50	1 / 3	1.90	IR49-PW01-11A	NSV	-- / --	NSV	Yes	(3) Detected, no screening value
trans-1,3-Dichloropropene	0.25 - 0.25	0 / 3	--	--	7.90	-- / --	0.032	No	HQ less than one, not detected
Trichloroethene	0.50 - 0.50	1 / 3	1.10	IR49-PW01-11A	NSV	-- / --	NSV	Yes	(3) Detected, no screening value
Trichlorofluoromethane (Freon-11)	0.50 - 0.50	0 / 3	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value
Vinyl chloride	0.50 - 0.50	1 / 3	0.30	IR49-PW01-11A	NSV	-- / --	NSV	Yes	(3) Detected, no screening value
Xylene, total	0.75 - 0.75	0 / 3	--	--	NSV	-- / --	NSV	Yes	(4) Not detected, no screening value

NOTES
1 - Marine Screening Values
2 - Count of detected samples exceeding or equaling Screening Value
3 - Categories are assigned to analytes retained as Step 2 COPCs as follows:
Category 1 – Contaminants with a maximum detection exceeding the ESV
Category 2– Undetected contaminants with a laboratory sample quantitation limit (SQL) exceeding the ESV
Category 3 – Detected contaminants with no ESV
Category 4 – Undetected contaminants with no ESV
COPC - Contaminant of Potential Concern
ESV - Ecological Screening Value
HQ - Hazard Quotient
NSV - No Screening Value
μg/L - micrograms per liter
Generated by: Sara Kent/ATL
Checked by: Rachel Zajac/RDU

TABLE G-9

Analytes that Failed Step 2 and Retained for Step 3 Screening

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Media	Category 1			Category 2			Category 3			Category 4			Total
	VOCs	SVOCs	Inorganics	VOCs	SVOCs	Inorganics	VOCs	SVOCs	Inorganics	VOCs	SVOCs	Inorganics	
Surface Soil	1	--	--	14	--	--	6	--	--	16	--	--	37
Subsurface Soil	--	--	--	9	--	--	5	--	--	17	--	--	31
Groundwater	--	--	1	--	6	2	10	--	8	16	48	4	95
Surface Water	--	--	--	--	--	--	--	--	--	26	--	--	26
Sediment	--	--	--	--	--	--	9	--	--	39	--	--	48
Porewater	--	--	--	--	--	--	8	--	--	18	--	--	26

Notes

Category 1 – Contaminants with a maximum detection exceeding the ESV

Category 2– Undetected contaminants with a laboratory sample quantitation limit (SQL) exceeding the ESV

Category 3 – Detected contaminants with no ESV

Category 4 – Undetected contaminants with no ESV

-- No analytes were retained

ESV - Ecological Screening Value

SVOC - Semivolatile Organic Compounds

VOC - Volatile Organic Compounds

Generated by: Sara Kent/ATL

Checked by: Rachel Zajac/RDU

TABLE G-10
Site 49 Surface Soil Screen - Step 3
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Exposure Point Concentration (EPC)	EPC Basis[1]	Screening Value	Supplemental Screening Value	Supplemental Screening Value Source	Frequency of Exceedance[2]	EPC Hazard Quotient	Step 3 COPC?	Retain?
Volatile Organic Compounds (UG/KG)													
1,1,1-Trichloroethane	0.49 - 210	0 / 13	--	--	--	--	100	--	--	-- / --	2.10	No	Not detected
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	0.49 - 210	0 / 13	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
1,1,2-Trichloroethane	0.49 - 210	0 / 13	--	--	--	--	100	--	--	-- / --	2.10	No	Not detected
1,1-Dichloroethene	0.49 - 210	0 / 13	--	--	--	--	100	--	--	-- / --	2.10	No	Not detected
1,2,4-Trichlorobenzene	0.49 - 210	0 / 13	--	--	--	--	10.0	--	--	-- / --	21.0	No	Not detected
1,2-Dibromo-3-chloropropane	0.49 - 210	0 / 13	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
1,2-Dibromoethane	0.49 - 210	0 / 13	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
1,2-Dichlorobenzene	0.49 - 100	0 / 13	--	--	--	--	10.0	--	--	-- / --	10.0	No	Not detected
1,3-Dichlorobenzene	0.25 - 100	0 / 13	--	--	--	--	10.0	--	--	-- / --	10.0	No	Not detected
1,4-Dichlorobenzene	0.25 - 210	0 / 13	--	--	--	--	10.0	--	--	-- / --	21.0	No	Not detected
2-Butanone	57.0 - 410	2 / 12	15.0	IR49-SS07-11A	--	--	NSV	--	--	-- / --	NSV	No	Common lab contaminant
2-Hexanone	0.49 - 210	0 / 13	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
4-Methyl-2-pentanone	0.49 - 210	0 / 13	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Acetone	110 - 810	3 / 13	220	IR49-SS07-11A	--	--	NSV	--	--	-- / --	NSV	No	Common lab contaminant
Bromodichloromethane	0.49 - 100	0 / 13	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Bromoform	0.25 - 210	0 / 13	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Bromomethane	0.49 - 410	0 / 13	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Carbon disulfide	14.0 - 58.0	7 / 13	45.0	IR49-SS12-11A	18.1	95% KM (BCA) UCL	NSV	94.1	Buchman, 2008	-- / --	0.19	No	Supplemental HQ less than one
Chlorobenzene	0.25 - 210	0 / 13	--	--	--	--	50.0	--	--	-- / --	4.20	No	Not detected
Chloroethane	0.49 - 210	0 / 13	--	--	--	--	100	--	--	-- / --	2.10	No	Not detected
Chloroform	0.25 - 210	0 / 13	--	--	--	--	1.00	--	--	-- / --	210	No	Not detected
Chloromethane	0.49 - 210	0 / 13	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
cis-1,2-Dichloroethene	0.25 - 210	0 / 13	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
cis-1,3-Dichloropropene	0.25 - 210	0 / 13	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Dibromochloromethane	0.49 - 210	0 / 13	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Dichlorodifluoromethane (Freon-12)	0.49 - 210	0 / 13	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Isopropylbenzene	0.25 - 210	0 / 13	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Methyl acetate	0.49 - 330	10 / 13	5,000	IR49-SS12-11A	--	--	NSV	--	--	-- / --	NSV	No	Uncertainty, no screening value
Methylcyclohexane	0.50 - 100	1 / 13	1.10	IR49-SS07-11A	--	--	NSV	--	--	-- / --	NSV	No	Uncertainty, no screening value
Methyl-tert-butyl ether (MTBE)	0.49 - 210	0 / 13	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Styrene	0.25 - 210	0 / 13	--	--	--	--	100	--	--	-- / --	2.10	No	Not detected
Tetrachloroethene	0.49 - 100	0 / 13	--	--	--	--	10.0	--	--	-- / --	10.0	No	Not detected
trans-1,3-Dichloropropene	0.49 - 100	0 / 13	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Trichloroethene	0.39 - 210	2 / 13	4.70	IR49-SS07-11A	4.7	Maximum Result	1.00	--	--	2 / 13	4.70	No	See text for discussion
Trichlorofluoromethane (Freon-11)	0.25 - 210	1 / 13	39.0	IR49-SS03-11A	28.5	Arithmetic Mean	NSV	16,400	Buchman, 2008	-- / --	0.002	No	Supplemental HQ less than one
Vinyl chloride	0.25 - 210	0 / 13	--	--	--	--	10.0	--	--	-- / --	21.0	No	Not detected
Xylene, total	0.74 - 410	0 / 13	--	--	--	--	50.0	--	--	-- / --	8.20	No	Not detected

NOTES

1 - ProUCL Version 4 does not offer a calculated UCL when there are too few unique detected results (one or sometimes more than one). In these instances, a 95% Chebyshev UCL using a proxy value of 1/2 the detection limit for NDs is calculated. If a conservative estimate of the mean could not be calculated, the arithmetic mean concentration was used as the EPC. The maximum detected concentration was retained as the EPC if the arithmetic mean was higher than the maximum.
2 - Count of detected samples exceeding or equaling Screening Value
EPC - Exposure Point Concentration
HQ - Hazard Quotient
ND - Non-detect
NSV - No Screening Value
UCL - Upper Confidence Limit
μg/kg - micrograms per kilogram
Generated by: Sara Kent/ATL
Checked by: Rachel Zajac/RDU

TABLE G-11
Site 49 Subsurface Soil Screen - Step 3
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Exposure Point Concentration (EPC)	EPC Basis[1]	Screening Value	Supplemental Screening Value	Supplemental Screening Value Source	Frequency of Exceedance[2]	EPC Hazard Quotient	Step 3 COPC?	Retain?
Volatile Organic Compounds (UG/KG)													
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	0.42 - 30.0	0 / 6	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
1,2,4-Trichlorobenzene	0.42 - 30.0	0 / 6	--	--	--	--	10.0	--	--	-- / --	3.00	No	Not detected
1,2-Dibromo-3-chloropropane	0.42 - 30.0	0 / 6	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
1,2-Dibromoethane	0.42 - 30.0	0 / 6	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
1,2-Dichlorobenzene	0.42 - 15.0	0 / 6	--	--	--	--	10.0	--	--	-- / --	1.50	No	Not detected
1,3-Dichlorobenzene	0.21 - 15.0	0 / 6	--	--	--	--	10.0	--	--	-- / --	1.50	No	Not detected
1,4-Dichlorobenzene	0.21 - 30.0	0 / 6	--	--	--	--	10.0	--	--	-- / --	3.00	No	Not detected
2-Butanone	-- - --	3 / 3	56.0	IR49-SB13-1_5-2-11A	--	--	NSV	--	--	-- / --	NSV	No	Common lab contaminant
2-Hexanone	0.42 - 30.0	0 / 6	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
4-Methyl-2-pentanone	0.42 - 30.0	0 / 6	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Acetone	-- - --	3 / 3	48.0	IR49-SB14-0_5-1-11A	--	--	NSV	--	--	-- / --	NSV	No	Common lab contaminant
Bromodichloromethane	0.42 - 15.0	0 / 6	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Bromoform	0.21 - 30.0	0 / 6	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Bromomethane	0.42 - 59.0	0 / 6	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Carbon disulfide	-- - --	6 / 6	7.10	IR49-SB13-1_5-2-11A	1.4	Arithmetic Mean	NSV	94.1	Buchman, 2008	-- / --	0.01	No	Supplemental HQ less than one
Chloroform	0.21 - 30.0	0 / 6	--	--	--	--	1.00	--	--	-- / --	30.0	No	Not detected
Chloromethane	0.42 - 30.0	0 / 6	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
cis-1,2-Dichloroethene	0.21 - 30.0	0 / 6	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
cis-1,3-Dichloropropene	0.21 - 30.0	0 / 6	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Dibromochloromethane	0.42 - 30.0	0 / 6	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Dichlorodifluoromethane (Freon-12)	0.42 - 30.0	0 / 6	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Isopropylbenzene	0.21 - 30.0	0 / 6	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Methyl acetate	0.42 - 0.53	1 / 6	120	IR49-SB13-1_5-2-11A	--	--	NSV	--	--	-- / --	NSV	No	Uncertainty, no screening value
Methylcyclohexane	0.42 - 0.53	1 / 6	1.00	IR49-SB13-1_5-2-11A	--	--	NSV	--	--	-- / --	NSV	No	Uncertainty, no screening value
Methyl-tert-butyl ether (MTBE)	0.42 - 30.0	0 / 6	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Tetrachloroethene	0.42 - 15.0	0 / 6	--	--	--	--	10.0	--	--	-- / --	1.50	No	Not detected
trans-1,3-Dichloropropene	0.42 - 15.0	0 / 6	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Trichloroethene	0.21 - 30.0	0 / 6	--	--	--	--	1.00	--	--	-- / --	30.0	No	Not detected
Trichlorofluoromethane (Freon-11)	0.21 - 30.0	0 / 6	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Vinyl chloride	0.21 - 30.0	0 / 6	--	--	--	--	10.0	--	--	-- / --	3.00	No	Not detected
Xylene, total	0.62 - 59.0	0 / 6	--	--	--	--	50.0	--	--	-- / --	1.18	No	Not detected

NOTES
1 - ProUCL Version 4 does not offer a calculated UCL when there are too few unique detected results (one or sometimes more than one). In these instances, a 95% Chebyshev UCL using a proxy value of 1/2 the detection limit for NDs is calculated. If a conservative estimate of the mean could not be calculated, the arithmetic mean concentration was used as the EPC. The maximum detected concentration was retained as the EPC if the arithmetic mean was higher than the maximum.
2 - Count of detected samples exceeding or equaling Screening Value
EPC - Exposure Point Concentration
HQ - Hazard Quotient
ND - Non-detect
NSV - No Screening Value
UCL - Upper Confidence Limit
μg/kg - micrograms per kilogram
Generated by: Sara Kent/ATL
Checked by: Rachel Zajac/RDU

TABLE G-12
Site 49 Groundwater Screen - Step 3
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Exposure Point Concentration (EPC)	EPC Basis[1]	Screening Value	Supplemental Screening Value	Supplemental Screening Value Source	Frequency of Exceedance[2]	EPC Hazard Quotient	Step 3 COPC?	Retain?
Volatile Organic Compounds (UG/L)													
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	0.50 - 1.00	0 / 15	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
1,1,2-Trichloroethane	0.50 - 1.00	5 / 15	6.02	IR49-TW07-10A	1.66	95% KM (t) UCL	NSV	275	TCEQ, 2006	-- / --	0.01	No	Supplemental HQ less than one
1,1-Dichloroethane	0.50 - 1.00	0 / 15	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
1,2-Dibromo-3-chloropropane	0.50 - 1.50	0 / 15	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
1,2-Dibromoethane	0.25 - 1.00	0 / 15	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
2-Butanone	0.50 - 5.00	0 / 15	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
2-Hexanone	0.50 - 5.00	0 / 15	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
4-Methyl-2-pentanone	0.50 - 5.00	0 / 15	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Acetone	1.80 - 5.50	3 / 15	6.07	IR49-TW08-10A	--	--	NSV	--	--	-- / --	NSV	No	Common lab contaminant
Bromodichloromethane	0.50 - 1.00	0 / 15	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Carbon disulfide	0.50 - 1.00	1 / 15	0.21	IR49-TW01-09C	0.21	Maximum Result	NSV	105	TCEQ, 2006*	-- / --	0.002	No	Supplemental HQ less than one
Chloroethane	0.50 - 1.00	0 / 15	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
cis-1,2-Dichloroethene	0.50 - 0.50	13 / 15	155	IR49-TW07-10A	73.8	95% KM (Chebyshev) UCL	NSV	680	TCEQ, 2006	-- / --	0.11	No	Supplemental HQ less than one
Cyclohexane	0.50 - 1.00	3 / 15	3.54	IR49-TW07-10A	--	--	NSV	--	--	-- / --	NSV	No	Uncertainty, no screening value
Dibromochloromethane	0.25 - 1.00	0 / 15	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Dichlorodifluoromethane (Freon-12)	0.50 - 1.00	0 / 15	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Isopropylbenzene	0.50 - 1.00	4 / 15	0.52	IR49-TW07-10A	0.439	95% KM (t) UCL	NSV	255	TCEQ, 2006*	-- / --	0.002	No	Supplemental HQ less than one
Methyl acetate	0.50 - 2.00	0 / 15	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Methylcyclohexane	0.50 - 1.00	3 / 15	5.86	IR49-TW07-10A	--	--	NSV	--	--	-- / --	NSV	No	Uncertainty, no screening value
Methyl-tert-butyl ether (MTBE)	0.50 - 1.00	0 / 15	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Styrene	0.10 - 1.00	0 / 15	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
trans-1,2-Dichloroethene	0.50 - 0.50	8 / 15	108	IR49-TW07-10A	31.6	95% KM (BCA) UCL	NSV	680	TCEQ, 2006	-- / --	0.05	No	Supplemental HQ less than one
Trichloroethene	0.50 - 1.50	6 / 15	276	IR49-TW07-10A	65.1	95% KM (t) UCL	NSV	970	TCEQ, 2006	-- / --	0.07	No	Supplemental HQ less than one
Trichlorofluoromethane (Freon-11)	0.50 - 1.00	0 / 15	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Vinyl chloride	0.50 - 1.00	6 / 15	22.1	IR49-TW06-10A	6.79	95% KM (t) UCL	NSV	2,820	TCEQ, 2006*	-- / --	0.002	No	Supplemental HQ less than one
Xylene, total	0.75 - 2.41	0 / 15	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Semivolatile Organic Compounds (UG/L)													
1,1-Biphenyl	9.80 - 9.80	0 / 1	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
2,2'-Oxybis(1-chloropropane)	9.80 - 9.80	0 / 1	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
2,4,5-Trichlorophenol	24.0 - 24.0	0 / 1	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
2,4,6-Trichlorophenol	9.80 - 9.80	0 / 1	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
2,4-Dichlorophenol	9.80 - 9.80	0 / 1	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
2,4-Dimethylphenol	9.80 - 9.80	0 / 1	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
2,4-Dinitrotoluene	9.80 - 9.80	0 / 1	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
2,6-Dinitrotoluene	9.80 - 9.80	0 / 1	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
2-Chloronaphthalene	9.80 - 9.80	0 / 1	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
2-Chlorophenol	9.80 - 9.80	0 / 1	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
2-Methylnaphthalene	9.80 - 9.80	0 / 1	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
2-Methylphenol	9.80 - 9.80	0 / 1	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
2-Nitroaniline	24.0 - 24.0	0 / 1	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
2-Nitrophenol	9.80 - 9.80	0 / 1	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
3,3'-Dichlorobenzidine	9.80 - 9.80	0 / 1	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
3-Nitroaniline	24.0 - 24.0	0 / 1	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
4,6-Dinitro-2-methylphenol	24.0 - 24.0	0 / 1	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
4-Bromophenyl-phenylether	9.80 - 9.80	0 / 1	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
4-Chloro-3-methylphenol	9.80 - 9.80	0 / 1	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
4-Chloroaniline	9.80 - 9.80	0 / 1	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
4-Chlorophenyl-phenylether	9.80 - 9.80	0 / 1	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
4-Methylphenol	9.80 - 9.80	0 / 1	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
4-Nitroaniline	24.0 - 24.0	0 / 1	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Acenaphthylene	9.80 - 9.80	0 / 1	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Acetophenone	9.80 - 9.80	0 / 1	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Anthracene	9.80 - 9.80	0 / 1	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Atrazine	9.80 - 9.80	0 / 1	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Benzaldehyde	9.80 - 9.80	0 / 1	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Benzo(a)anthracene	9.80 - 9.80	0 / 1	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Benzo(a)pyrene	9.80 - 9.80	0 / 1	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected

TABLE G-12
Site 49 Groundwater Screen - Step 3
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Exposure Point Concentration (EPC)	EPC Basis[1]	Screening Value	Supplemental Screening Value	Supplemental Screening Value Source	Frequency of Exceedance[2]	EPC Hazard Quotient	Step 3 COPC?	Retain?
Benzo(b)fluoranthene	9.80 - 9.80	0 / 1	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Benzo(g,h,i)perylene	9.80 - 9.80	0 / 1	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Benzo(k)fluoranthene	9.80 - 9.80	0 / 1	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
bis(2-Chloroethoxy)methane	9.80 - 9.80	0 / 1	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
bis(2-Chloroethyl)ether	9.80 - 9.80	0 / 1	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
bis(2-Ethylhexyl)phthalate	9.80 - 9.80	0 / 1	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Caprolactam	9.80 - 9.80	0 / 1	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Carbazole	9.80 - 9.80	0 / 1	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Chrysene	9.80 - 9.80	0 / 1	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Dibenz(a,h)anthracene	9.80 - 9.80	0 / 1	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Dibenzofuran	9.80 - 9.80	0 / 1	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Di-n-butylphthalate	9.80 - 9.80	0 / 1	--	--	--	--	3.40	--	--	-- / --	2.88	No	Not detected
Di-n-octylphthalate	9.80 - 9.80	0 / 1	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Fluoranthene	9.80 - 9.80	0 / 1	--	--	--	--	1.60	--	--	-- / --	6.13	No	Not detected
Fluorene	9.80 - 9.80	0 / 1	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Hexachlorobenzene	9.80 - 9.80	0 / 1	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Hexachlorobutadiene	9.80 - 9.80	0 / 1	--	--	--	--	0.32	--	--	-- / --	30.6	No	Not detected
Hexachlorocyclopentadiene	9.80 - 9.80	0 / 1	--	--	--	--	0.070	--	--	-- / --	140	No	Not detected
Hexachloroethane	9.80 - 9.80	0 / 1	--	--	--	--	9.40	--	--	-- / --	1.04	No	Not detected
Indeno(1,2,3-cd)pyrene	9.80 - 9.80	0 / 1	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
n-Nitroso-di-n-propylamine	9.80 - 9.80	0 / 1	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Pentachlorophenol	24.0 - 24.0	0 / 1	--	--	--	--	7.90	--	--	-- / --	3.04	No	Not detected
Phenanthrene	9.80 - 9.80	0 / 1	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Pyrene	9.80 - 9.80	0 / 1	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Inorganics (UG/L)													
Antimony	15.0 - 15.0	0 / 1	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Beryllium	5.00 - 5.00	0 / 1	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Cobalt	15.0 - 15.0	0 / 1	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Copper	10.0 - 10.0	0 / 1	--	--	--	--	3.10	--	--	-- / --	3.23	No	Not detected
Silver	10.0 - 10.0	0 / 1	--	--	--	--	0.23	--	--	-- / --	43.5	No	Not detected
Vanadium	15.0 - 15.0	0 / 1	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected

NOTES
* Fresh water screening value
1 - ProUCL Version 4 does not offer a calculated UCL when there are too few unique detected results (one or sometimes more than one). In these instances, a 95% Chebyshev UCL using a proxy value of 1/2 the detection limit for NDs is calculated. If a conservative estimate of the mean could not be calculated, the arithmetic mean concentration was used as the EPC. The maximum detected concentration was retained as the EPC if the arithmetic mean was higher than the maximum.
2 - Count of detected samples exceeding or equaling Screening Value
EPC - Exposure Point Concentration
HQ - Hazard Quotient
ND - Non-detect
NSV - No Screening Value
UCL - Upper Confidence Limit
µg/L - micrograms per liter
Generated by: Sara Kent/ATL
Checked by: Rachel Zajac/RDU

TABLE G-13

Site 49 Surface Water Screen - Step 3

Site 49

MCIEAST-MCB CAMLEJ

North Carolina

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Exposure Point Concentration (EPC)	EPC Basis[1]	Screening Value	Supplemental Screening Value	Supplemental Screening Value Source	Frequency of Exceedance[2]	EPC Hazard Quotient	Step 3 COPC?	Retain?
Volatile Organic Compounds (UG/L)													
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	0.50 - 0.50	0 / 2	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
1,1,2-Trichloroethane	0.50 - 0.50	0 / 2	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
1,1-Dichloroethane	0.50 - 0.50	0 / 2	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
1,2-Dibromo-3-chloropropane	0.50 - 0.50	0 / 2	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
1,2-Dibromoethane	0.25 - 0.25	0 / 2	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
2-Butanone	0.50 - 0.50	0 / 2	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
2-Hexanone	0.50 - 0.50	0 / 2	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
4-Methyl-2-pentanone	0.50 - 0.50	0 / 2	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Acetone	6.30 - 6.90	0 / 2	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Bromodichloromethane	0.50 - 0.50	0 / 2	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Carbon disulfide	0.50 - 0.50	0 / 2	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Chloroethane	0.50 - 0.50	0 / 2	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
cis-1,2-Dichloroethene	0.50 - 0.50	0 / 2	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Cyclohexane	0.50 - 0.50	0 / 2	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Dibromochloromethane	0.25 - 0.25	0 / 2	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Dichlorodifluoromethane (Freon-12)	0.50 - 0.50	0 / 2	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Isopropylbenzene	0.50 - 0.50	0 / 2	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Methyl acetate	0.50 - 0.50	0 / 2	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Methylcyclohexane	0.50 - 0.50	0 / 2	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Methyl-tert-butyl ether (MTBE)	0.50 - 0.50	0 / 2	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Styrene	0.10 - 0.10	0 / 2	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
trans-1,2-Dichloroethene	0.50 - 0.50	0 / 2	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Trichloroethene	0.50 - 0.50	0 / 2	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Trichlorofluoromethane (Freon-11)	0.50 - 0.50	0 / 2	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Vinyl chloride	0.50 - 0.50	0 / 2	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Xylene, total	0.75 - 0.75	0 / 2	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected

NOTES

1 - ProUCL Version 4 does not offer a calculated UCL when there are too few unique detected results (one or sometimes more than one). In these instances, a 95% Chebyshev UCL using a proxy value of 1/2 the detection limit for NDs is calculated. If a conservative estimate of the mean could not be calculated, the arithmetic mean concentration was used as the EPC. The maximum detected concentration was retained as the EPC if the arithmetic mean was higher than the maximum.

2 - Count of detected samples exceeding or equaling Screening Value

EPC - Exposure Point Concentration

HQ - Hazard Quotient

ND - Non-detect

NSV - No Screening Value

UCL - Upper Confidence Limit

µg/L - micrograms per liter

Generated by: Sara Kent/ATL

Checked by: Rachel Zajac/RDU

TABLE G-14
Site 49 Sediment Screen - Step 3
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

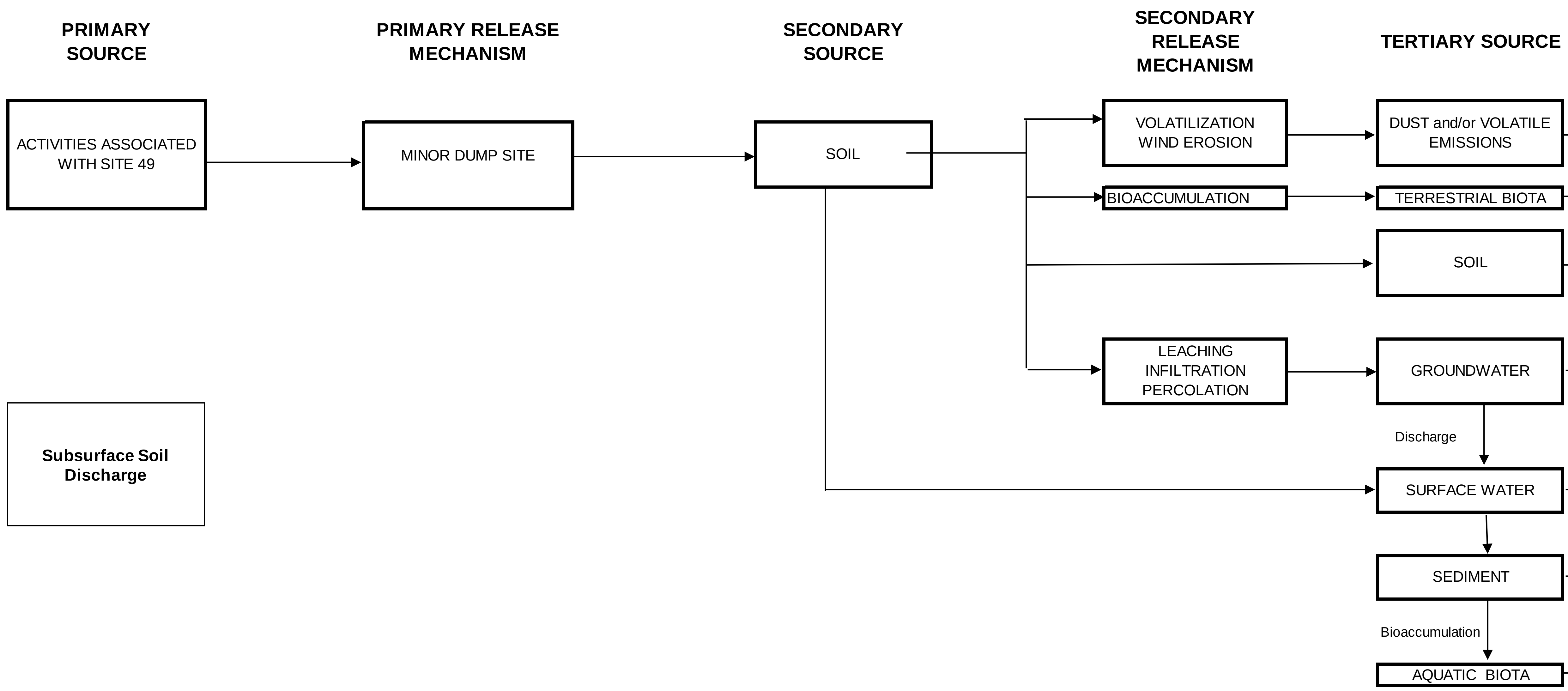
Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Exposure Point Concentration (EPC)	EPC Basis[1]	Screening Value	Supplemental Screening Value	Supplemental Screening Value Source	Frequency of Exceedance[2]	EPC Hazard Quotient	Step 3 COPC?	Retain?
Volatile Organic Compounds (UG/KG)													
1,1,1-Trichloroethane	0.52 - 330	0 / 5	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
1,1,2,2-Tetrachloroethane	0.52 - 660	0 / 5	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	0.52 - 330	0 / 5	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
1,1,2-Trichloroethane	0.52 - 330	0 / 5	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
1,1-Dichloroethane	0.26 - 170	0 / 5	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
1,1-Dichloroethene	0.52 - 330	0 / 5	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
1,2,4-Trichlorobenzene	0.52 - 330	0 / 5	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
1,2-Dibromo-3-chloropropane	0.52 - 330	0 / 5	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
1,2-Dibromoethane	0.52 - 330	0 / 5	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
1,2-Dichlorobenzene	0.52 - 170	0 / 5	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
1,2-Dichloroethane	0.52 - 170	0 / 5	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
1,2-Dichloropropane	0.52 - 330	0 / 5	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
1,3-Dichlorobenzene	0.26 - 170	0 / 5	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
1,4-Dichlorobenzene	0.26 - 330	0 / 5	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
2-Butanone	110 - 660	2 / 5	57.0	IR49-SD03-11A	--	--	NSV	--	--	-- / --	NSV	No	Common lab contaminant
2-Hexanone	0.52 - 330	0 / 5	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
4-Methyl-2-pentanone	0.52 - 330	0 / 5	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Acetone	210 - 1,400	1 / 5	28.0	IR49-SD04-11B	--	--	NSV	--	--	-- / --	NSV	No	Common lab contaminant
Benzene	42.0 - 330	1 / 5	0.46	IR49-SD04-11B	0.46	Maximum Result	NSV	140	TCEQ, 2006	-- / --	0.003	No	Supplemental HQ less than one
Bromodichloromethane	0.52 - 170	0 / 5	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Bromoform	0.26 - 330	0 / 5	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Bromomethane	0.52 - 660	0 / 5	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Carbon disulfide	27.0 - 27.0	4 / 5	93.0	IR49-SD02-11A	86.7	95% KM (t) UCL	NSV	120	TCEQ, 2006*	-- / --	0.72	No	Supplemental HQ less than one
Carbon tetrachloride	0.26 - 170	0 / 5	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Chlorobenzene	0.26 - 330	0 / 5	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Chloroethane	0.52 - 330	0 / 5	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Chloroform	0.26 - 330	0 / 5	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Chloromethane	0.52 - 330	0 / 5	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
cis-1,2-Dichloroethene	0.26 - 330	0 / 5	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
cis-1,3-Dichloropropene	0.26 - 330	0 / 5	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Cyclohexane	0.52 - 330	0 / 5	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Dibromochloromethane	0.52 - 330	0 / 5	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Dichlorodifluoromethane (Freon-12)	42.0 - 330	1 / 5	0.37	IR49-SD04-11B	--	--	NSV	--	--	-- / --	NSV	No	Uncertainty, no screening value
Ethylbenzene	42.0 - 330	1 / 5	0.31	IR49-SD04-11B	0.31	Maximum Result	NSV	650	TCEQ, 2006	-- / --	4.77E-04	No	Supplemental HQ less than one
Isopropylbenzene	0.26 - 330	0 / 5	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Methyl acetate	0.52 - 0.52	4 / 5	1,900	IR49-SD02-11A	--	--	NSV	--	--	-- / --	NSV	No	Uncertainty, no screening value
Methylcyclohexane	0.52 - 170	0 / 5	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Methylene chloride	22.0 - 170	1 / 5	0.54	IR49-SD04-11B	0.54	Maximum Result	NSV	3,820	TCEQ, 2006	-- / --	1.41E-04	No	Supplemental HQ less than one
Methyl-tert-butyl ether (MTBE)	0.52 - 330	0 / 5	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Styrene	0.26 - 330	0 / 5	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Tetrachloroethene	0.52 - 170	0 / 5	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Toluene	42.0 - 330	1 / 5	0.60	IR49-SD04-11B	0.6	Maximum Result	NSV	940	TCEQ, 2006	-- / --	0.001	No	Supplemental HQ less than one
trans-1,2-Dichloroethene	0.26 - 170	0 / 5	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
trans-1,3-Dichloropropene	0.52 - 170	0 / 5	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Trichloroethene	0.26 - 330	0 / 5	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Trichlorofluoromethane (Freon-11)	0.26 - 330	0 / 5	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Vinyl chloride	0.26 - 330	0 / 5	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Xylene, total	0.78 - 660	0 / 5	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected

NOTES
* Fresh water screening value
1 - ProUCL Version 4 does not offer a calculated UCL when there are too few unique detected results (one or sometimes more than one). In these instances, a 95% Chebyshev UCL using a proxy value of 1/2 the detection limit for NDs is calculated. If a conservative estimate of the mean could not be calculated, the arithmetic mean concentration was used as the EPC. The maximum detected concentration was retained as the EPC if the arithmetic mean was higher than the maximum.
2 - Count of detected samples exceeding or equaling Screening Value
EPC - Exposure Point Concentration
HQ - Hazard Quotient
ND - Non-detect
NSV - No Screening Value
UCL - Upper Confidence Limit
µg/kg - micrograms per kilogram
Generated by: Sara Kent/ATL
Checked by: Rachel Zajac/RDU

TABLE G-15
Site 49 Porewater Screen - Step 3
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Exposure Point Concentration (EPC)	EPC Basis[1]	Screening Value	Supplemental Screening Value	Supplemental Screening Value Source	Frequency of Exceedance[2]	EPC Hazard Quotient	Step 3 COPC?	Retain?
Volatile Organic Compounds (UG/L)													
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	0.50 - 0.50	0 / 3	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
1,1,2-Trichloroethane	0.50 - 0.50	0 / 3	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
1,1-Dichloroethane	0.50 - 0.50	0 / 3	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
1,2-Dibromo-3-chloropropane	0.50 - 0.50	0 / 3	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
1,2-Dibromoethane	0.25 - 0.25	0 / 3	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
2-Butanone	0.50 - 0.50	2 / 3	2.60	IR49-PW01-11A	--	--	NSV	--	--	-- / --	NSV	No	Common lab contaminant
2-Hexanone	0.50 - 0.50	0 / 3	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
4-Methyl-2-pentanone	0.50 - 0.50	0 / 3	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Acetone	5.60 - 7.60	1 / 3	100	IR49-PW01-11A	--	--	NSV	--	--	-- / --	NSV	No	Common lab contaminant
Bromodichloromethane	0.50 - 0.50	0 / 3	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Carbon disulfide	0.50 - 0.50	2 / 3	0.39	IR49-PW01-11A	0.28	Arithmetic Mean	NSV	105	TCEQ, 2006*	-- / --	0.003	No	Supplemental HQ less than one
Chloroethane	0.50 - 0.50	0 / 3	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
cis-1,2-Dichloroethene	0.50 - 0.50	1 / 3	2.50	IR49-PW01-11A	1	Arithmetic Mean	NSV	680	TCEQ, 2006	-- / --	0.001	No	Supplemental HQ less than one
Cyclohexane	0.50 - 0.50	0 / 3	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Dibromochloromethane	0.25 - 0.25	0 / 3	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Dichlorodifluoromethane (Freon-12)	0.50 - 0.50	0 / 3	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Isopropylbenzene	0.50 - 0.50	0 / 3	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Methyl acetate	0.50 - 0.50	2 / 3	0.97	IR49-PW01-11A	--	--	NSV	--	--	-- / --	NSV	No	Uncertainty, no screening value
Methylcyclohexane	0.50 - 0.50	0 / 3	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Methyl-tert-butyl ether (MTBE)	0.50 - 0.50	0 / 3	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Styrene	0.10 - 0.10	0 / 3	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
trans-1,2-Dichloroethene	0.50 - 0.50	1 / 3	1.90	IR49-PW01-11A	0.8	Arithmetic Mean	NSV	680	TCEQ, 2006	-- / --	0.001	No	Supplemental HQ less than one
Trichloroethene	0.50 - 0.50	1 / 3	1.10	IR49-PW01-11A	0.53	Arithmetic Mean	NSV	970	TCEQ, 2006	-- / --	0.001	No	Supplemental HQ less than one
Trichlorofluoromethane (Freon-11)	0.50 - 0.50	0 / 3	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected
Vinyl chloride	0.50 - 0.50	1 / 3	0.30	IR49-PW01-11A	0.27	Arithmetic Mean	NSV	2,820	TCEQ, 2006*	-- / --	9.57E-05	No	Supplemental HQ less than one
Xylene, total	0.75 - 0.75	0 / 3	--	--	--	--	NSV	--	--	-- / --	NSV	No	Not detected

NOTES
* Fresh water screening value
1 - ProUCL Version 4 does not offer a calculated UCL when there are too few unique detected results (one or sometimes more than one). In these instances, a 95% Chebyshev UCL using a proxy value of 1/2 the detection limit for NDs is calculated. If a conservative estimate of the mean could not be calculated, the arithmetic mean concentration was used as the EPC. The maximum detected concentration was retained as the EPC if the arithmetic mean was higher than the maximum.
2 - Count of detected samples exceeding or equaling Screening Value
EPC - Exposure Point Concentration
HQ - Hazard Quotient
ND - Non-detect
NSV - No Screening Value
UCL - Upper Confidence Limit
µg/L - micrograms per liter
Generated by: Sara Kent/ATL
Checked by: Rachel Zajac/RDU



EXPOSURE ROUTE	Terrestrial Plants	Terrestrial Invertebrates	Aquatic Biota	Benthic Invertebrates	Terrestrial Birds and Mammals*	Semi-aquatic Birds and Mamamls*
Inhalation (vapor)		P			P	P
Inhalation (dust)		P			P	P
Foliar Uptake	P					
Ingestion					C	
Root Contact	C					
Dermal Contact		C			P	
Ingestion		P			C	
Root Contact	P					
Root Contact						
Dermal Contact			C	C	P	P
Ingestion			P	P	C	C
Root Contact		C				
Dermal Contact		C	C	C		P
Ingestion			P	P		C
Ingestion						C

C - Pathway considered complete for purposes of ecological risk assessment

P - Pathway considered potentially complete, but insignificant

* Terrestrial birds and mammals include American robin, mourning dove, Canada goose, red-tailed hawk, meadow vole, short-tailed shrew, white-footed mouse, red fox, and white-tailed deer

Semi-aquatic birds and mammals include Belted kingfisher, osprey, raccoon, and muskrat.

Figure G-1
Conseptual Site Model of Ecological Exposures at Site 49
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Appendix H
Cost Estimates

TABLE 10-2

Summary of Cost Analysis

Site 49 Remedial Investigation/Feasibility Study

MCIEAST-MCB CAMLEJ, North Carolina

General Response Action	Alternative 2 MNA and LUCs[a]			Alternative 3 EISB, LUCs and LTM[b]			Alternative 4 Air Sparging, LUCs and LTM[c]		
	-30%	**Estimate**	**+50%**	**-30%**	**Estimate**	**+50%**	**-30%**	**Estimate**	**+50%**
Total Capital Costs	**$9,100**	**$13,000**	**$19,500**	**$128,100**	**$183,000**	**$274,500**	**$118,300**	**$169,000**	**$253,500**
Subsequent Years' Costs	$107,800	$154,000	$231,000	$120,400	$172,000	$258,000	$205,800	$294,000	$441,000
Total Present Worth Costs[d]	**$116,900**	**$167,000**	**$250,500**	**$248,500**	**$355,000**	**$532,500**	**$324,100**	**$463,000**	**$694,500**

[a] Includes 30 years of biennial GW monitoring

[b] Includes 4 years of GW monitoring

[c] Includes 3 years of system operations and 7 years of GW monitoring after system shut down

[d] Includes 7% discount rate

Alternative 2: MNA and LUCs

Site: Site 49
Location: Site 49 - Camp Lejeune, NC
Phase: Draft FS
Base Year: 2012

KEY ASSUMPTIONS

1. Surveyor will take 1 (10-hr) day.
2. Four existing groundwater monitoring wells within the site boundary will be monitored during all sampling events.
3. Each sampling event will take 2 Geologists - one (10-hr) day.
4. Monitoring will be conducted every 2 years until RAOs are achieved (estimated to be 30 years).
5. Groundwater analysis: Site-related COCs and their degradation products (1,1,2,2-PCA, 1,1,2-TCA, PCE, TCE, *cis*-DCE, *trans*-DCE, VC, Benzene; 1,2-DCA, chloroethane, 1,1-DCE, ethene, and ethane) and field water quality parameters (dissolved oxygen, oxidation-reduction potential, pH, salinity, specific conductivity, temperature and turbidity).
6. The total number of samples for VOCs is 9 (4 normal GW, 1 trip blank, 1 field duplicate, 1 MS, 1 MSD, 1 equipment blank).
7. Design details are conceptual in nature and presented in this FS to develop costs for alternative comparison.

Alternative 2: MNA and LUCs

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES
CAPITAL COSTS					
<u>Land Use Controls</u>					
Signs	4	EACH	$294	$1,176	R.S. Means #10-14-19.10 (2100)
Deed Notifications	1	LS	$5,000	$5,000	Engineer's Estimate
SUBTOTAL				**$6,176**	
<u>Surveying LUCs</u>					
Surveyor	1	LS	$1,500	$1,500	Engineer's Estimate
Geologist	10	HR	$80	$800	Navy CLEAN Rate
Geologist (Per Diem)	1	DY	$142	$142	DOD Per Diem
SUBTOTAL				**$2,442**	
COMBINED SUBTOTAL				**$8,618**	
Contingency	15%	of	$8,618	$1,293	
Project Management	8%	of	$8,618	$689	
Remedial Design	15%	of	$8,618	$1,293	
Construction Management	10%	of	$8,618	$862	
TOTAL CAPITAL COSTS				**$12,755**	
OPERATION AND MAINTENANCE COSTS					
<u>Cost per Land Use Controls Inspection (Years 1-30)</u>					
Annual Inspection (Engineer)	1	LS	$1,000	$1,000	Navy CLEAN Rate
SUBTOTAL				**$1,000**	
<u>Cost per Long-Term Monitoring (Years 1-30)</u>					Every 2 years
Field Work (1 day - 2 Geologists)	20	HR	$80	$1,600	Navy CLEAN Rate
Field Equipment	1	LS	$1,500	$1,500	Engineer's Estimate
Geologists (per diem, 2-person crew)	1	DY	$284	$284	Engineer's Estimate
Analytical (VOCs)	1	LS	$990	$990	2009 Navy CLEAN BOA Rates
Data Validation (VOCs)	1	LS	$189	$189	2010 Navy CLEAN BOA Rates
Data Analysis/Interpretation	15	HR	$120	$1,800	Engineer's Estimate
Report	1	LS	$10,000	$10,000	Engineer's Estimate
SUBTOTAL				**$16,363**	
SUBTOTAL					
Contingency	15%		$16,363	$2,454	
Project Management	8%	of	$16,363	$1,309	
LTM Costs				**$20,126**	

PRESENT VALUE ANALYSIS Discount Rate : 7.0%

USEPA. 2000. *A Guide to Developing and Documenting Cost Estimates during the Feasibility Study.* EPA/540/R-00/002. July.

END YEAR	DESCRIPTION	TOTAL COST	TOTAL COST PER YEAR	DISCOUNT FACTOR	PRESENT VALUE
0	Total Capital Costs	$12,755	$12,755	1	$12,755
1	Total Annual O&M Costs	$33,881	$21,126	0.935	$31,665
2	Total Annual O&M Costs	$34,881	$1,000	0.873	$873
3	Total Annual O&M Costs	$56,008	$21,126	0.816	$17,246
4	Total Annual O&M Costs	$57,008	$1,000	0.763	$763
5	Total Annual O&M Costs	$78,134	$21,126	0.713	$15,063
6	Total Annual O&M Costs	$79,134	$1,000	0.666	$666
7	Total Annual O&M Costs	$100,261	$21,126	0.623	$13,157
8	Total Annual O&M Costs	$101,261	$1,000	0.582	$582
9	Total Annual O&M Costs	$122,387	$21,126	0.544	$11,491
10	Total Annual O&M Costs	$123,387	$1,000	0.508	$508
11	Total Annual O&M Costs	$144,514	$21,126	0.475	$10,037
12	Total Annual O&M Costs	$145,514	$1,000	0.444	$444
13	Total Annual O&M Costs	$166,640	$21,126	0.415	$8,767
14	Total Annual O&M Costs	$167,640	$1,000	0.388	$388
15	Total Annual O&M Costs	$188,767	$21,126	0.362	$7,657
16	Total Annual O&M Costs	$189,767	$1,000	0.339	$339
17	Total Annual O&M Costs	$210,893	$21,126	0.317	$6,688
18	Total Annual O&M Costs	$211,893	$1,000	0.296	$296
19	Total Annual O&M Costs	$233,020	$21,126	0.277	$5,842
20	Total Annual O&M Costs	$234,020	$1,000	0.258	$258
21	Total Annual O&M Costs	$255,146	$21,126	0.242	$5,102
22	Total Annual O&M Costs	$256,146	$1,000	0.226	$226
23	Total Annual O&M Costs	$277,273	$21,126	0.211	$4,457
24	Total Annual O&M Costs	$278,273	$1,000	0.197	$197
25	Total Annual O&M Costs	$299,399	$21,126	0.184	$3,893
26	Total Annual O&M Costs	$300,399	$1,000	0.172	$172
27	Total Annual O&M Costs	$321,526	$21,126	0.161	$3,400
28	Total Annual O&M Costs	$322,526	$1,000	0.150	$150
29	Total Annual O&M Costs	$343,652	$21,126	0.141	$2,970
30	Total Annual O&M Costs	$344,652	$1,000	0.131	$131
	TOTAL SUBSEQUENT YEARS				$153,427
	SUBTOTAL				**$166,182**

TOTAL PRESENT VALUE OF ALTERNATIVE 2	**$167,000**
TOTAL PRESENT VALUE OF ALTERNATIVE 2 (+50%)	**$251,000**
TOTAL PRESENT VALUE OF ALTERNATIVE 2 (-30%)	**$117,000**

This cost estimate has been prepared in accordance with EPA 540-R-00-002 and represents a (-30 to +50 percent) range of accuracy. This estimate is limited to the conditions existing at its issuance and is not a guaranty of actual price or cost. Uncertain market conditions such as, but not limited to: local labor or contractor availability, wages, other work, material market fluctuations, price escalations, force majeure events, and developing bidding conditions, may affect the accuracy of this estimate. CH2M HILL is not responsible for any variance from this estimate or actual prices and conditions obtained.

Alternative 3: EISB, LUCs, and LTM

Site: Site 49
Location: Site 49 - Camp Lejeune, NC
Phase: Draft FS
Base Year: 2012

KEY ASSUMPTIONS

1. Six injection wells will be installed and screened from 8 to 23 feet bgs and 40 DPT injections to 10 feet bgs.
2. Injection well installation will take 7 days (10 hrs/day), DPT injections will take 4 days (10hrs/day).
3. Utility clearance and surveyor will take one (1) (10-hr) day total.
4. Four existing groundwater monitoring wells will be monitored during all sampling events.
5. Each sampling event will take 2 Geologists one (1) (10-hr) day.
6. Monitoring will be conducted quarterly in year 1 and annually in years 2 through 5 until RAOs are achieved (estimated to be 5 years or less).
7. Groundwater analysis: Site-related COCs and their degradation products (1,1,2,2-PCA, 1,1,2-TCA, PCE, TCE, *cis*-DCE, *trans*-DCE, VC, Benzene; 1,2-DCA, chloroethane, 1,1-DCE, ethene, and ethane) as well as geochemical parameters (alkalinity, TOC, nitrate, nitrite, sulfate, sulfide, methane, Fe^{2+}), and field water quality parameters (dissolved oxygen, oxidation-reduction potential, pH, salinity, specific conductivity, temperature and turbidity). Semi-annual monitoring of volatile fatty acids (VFAs) and microbial test (CENSUS) from 2 selected wells during performance monitoring.
8. The total number of samples for VOCs is 9 (4 normal GW, 1 trip blank, 1 field duplicate, 1 MS, 1 MSD, 1 equipment blank). Samples for geochemical parameters, VFAs, and CENSUS don't need any QA/QC samples.
9. The estimated dosage of lactate 60% solution is 370 lbs. A mobile porosity of 0.20 is assumed.
10. Injection can be completed in a 8-day period in each injection event (7-day injection plus 1 day for mobiization/demobilization), assuming average injection rate of 2 gpm, 10 hours of injection per day, simultaneous injection into 3 locations.
11. Re-injection is scheduled at 6 months after the initial injection.
12. 11 Liters of KB-1 Plus would be injected with each injection event.
13. Design details are conceptual in nature and presented in this FS to develop costs for alternative comparison.

Alternative 3: EISB, LUCs, and LTM

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES
CAPITAL COSTS					
Land Use Controls					
Signs	4	EACH	$294	$1,176	R.S. Means #10-14-19.10 (2100)
Deed Notifications	1	LS	$5,000	$5,000	Engineer's Estimate
SUBTOTAL				**$6,176**	
Utility Locator and Surveyor (Well Installation)					
Private Utility Locator	1	LS	$1,500	$1,500	Engineer's Estimate
Surveyor	1	LS	$1,500	$1,500	2-surveyors 1 day on site (Oct. 2009 BOA Rates)
Geologist	10	HR	$80	$800	Navy CLEAN Rate
Geologist (Per Diem)	1	DY	$142	$142	DOD Per Diem
SUBTOTAL				**$3,942**	
Injection Well Installation (6 wells to 23 feet) and DPT Injections (40 points to 10 feet)					
Drilling costs 25 ft wells, includes well installation and completion	1	LS	$15,000	$15,000	Engineer's estimate based on drilling BOA rates
DPT costs for 40 injecton points	1	LS	$12,000	$12,000	Estimate based on subcontractor quote
Disposal of Generated Wastes	12	EA	$94	$1,128	2010 Navy CLEAN BOA Rates, assuming 2 drums per well (1 water 1 soil)
Geologist	110	HR	$80	$8,800	Engineer's estimate
Geologist (per diem)	11	DY	$142	$1,562	DOD Travel Per Diem Allowance, FY2011
Field Monitoring Equipment	11	DY	$100	$1,100	
SUBTOTAL				**$39,590**	
Baseline Monitoring Event					
Field Work (1 day - 2 Geologists)	20	HR	$80	$1,600	Navy CLEAN Rate
Field Equipment	1	LS	$1,500	$1,500	Engineer's Estimate
Geologists (per diem, 2-person crew)	1	DY	$284	$284	DOD Travel Per Diem Allowance, FY2009
Analytical (VOCs and Geochem)	1	LS	$2,074	$2,074	2009 Navy CLEAN BOA Rates
Data Validation (VOCs)	1	LS	$189	$189	2010 Navy CLEAN BOA Rates
Data Analysis/Interpretation	15	HR	$120	$1,800	Engineer's Estimate
SUBTOTAL				**$7,447**	
EISB Injections					
Lactate (Including Delivery)	2	Drum	$1,090	$2,180	JRW Bioremediation LLC (Nov. 2011)
Culture (KB-1 Plus)	11	Liter	$360	$3,960	SIREM (Nov. 2011)
Shipping of Culture	1	LS	$550	$550	SIREM (Nov. 2011)
Sodium Bicarbonate	276	LB	$0.65	$179	Engineer's Estimate
Injection Equipment and Material	1	LS	$20,000	$20,000	Engineer's Estimate
Equipment Setup	10	HR	$100	$1,000	Navy CLEAN Rate
Engineer/Hydrogeologist	160	HR	$100	$16,000	2 people, eight 10-hr days
Engineer/Hydrogeologist (per diem, 2-person crew)	8	DY	$284	$2,272	DOD Travel Per Diem Allowance, FY2009
SUBTOTAL				**$46,141**	
Reporting					
Construction Completion Report	1	LS	$20,000	$20,000	Engineer's Estimate
SUBTOTAL				**$20,000**	
COMBINED SUBTOTAL				**$123,296**	
Contingency	15%	of	$123,296	$18,494	
Project Management	8%	of	$123,296	$9,864	
Remedial Design	15%	of	$123,296	$18,494	
Construction Management	10%	of	$123,296	$12,330	
TOTAL CAPITAL COSTS				**$182,479**	

Alternative 3: EISB, LUCs, and LTM

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES
OPERATION AND MAINTENANCE COSTS					
Cost per Land Use Controls Inspection (Years 1-5)					
Annual Inspection (Engineer)	1	LS	$1,000	$1,000	Navy CLEAN Rate
SUBTOTAL				**$1,000**	
Cost for EISB Performance Monitoring (Year 1)					
Quarterly groundwater monitoring					4 Events
Field Work (1 day - 2 Geologists)	80	HR	$80	$6,400	Navy CLEAN Rate
Field Equipment	4	LS	$1,500	$6,000	Engineer's Estimate
Geologists (per diem, 2-person crew)	4	DY	$284	$1,136	DOD Travel Per Diem Allowance, FY2009
Analytical (VOCs and Geochem)	4	LS	$2,074	$8,296	2009 Navy CLEAN BOA Rates
Data Validation (VOCs)	4	LS	$189	$756	2010 Navy CLEAN BOA Rates
Data Analysis/Interpretation	40	HR	$120	$4,800	Engineer's Estimate
Semiannual groundwater monitoring (VFAs and CENSUS)	2	LS	$1,000	$2,000	Microbial Insights Price; 2 wells only
Annual Report	1	LS	$10,000	$10,000	Engineer's Estimate
SUBTOTAL				**$39,388**	
Cost Per EISB Re-injection (During Year 1)					1 event
ERD EVO Injection - Field Work	1	LS	$46,141	$46,141	
SUBTOTAL				**$46,141**	
Subtotal for Year 1				**$86,529**	
Contingency	15%	of	$86,529	$12,979	
Project Management	8%	of	$86,529	$6,922	
Total Year 1				**$106,431**	
Cost per Performance Monitoring (Years 2-5)					
Annual groundwater monitoring					
Field Work (1 day - 2 Geologists)	20	HR	$80	$1,600	Navy CLEAN Rate
Field Equipment	1	LS	$1,500	$1,500	Engineer's Estimate
Geologists (per diem, 2-person crew)	1	DY	$284	$284	DOD Travel Per Diem Allowance, FY2009
Analytical (VOCs, Geochem)	1	LS	$2,074	$2,074	2009 Navy CLEAN BOA Rates
Data Validation (VOCs)	1	LS	$189	$189	2010 Navy CLEAN BOA Rates
Data Analysis/Interpretation	15	HR	$120	$1,800	Engineer's Estimate
Annual Report	1	LS	$10,000	$10,000	Engineer's Estimate
SUBTOTAL (includes $1,000 LUC inspection)				**$18,447**	
Contingency	15%	of	$18,447	**$2,767**	
Project Management	8%	of	$18,447	$1,476	
Total Years 2-5				**$22,690**	

PRESENT VALUE ANALYSIS Discount Rate : 7.0%

USEPA. 2000. *A Guide to Developing and Documenting Cost Estimates during the Feasibility Study.* EPA/540/R-00/002. July.

END YEAR	DESCRIPTION	TOTAL COST	TOTAL COST PER YEAR	DISCOUNT FACTOR	PRESENT VALUE	
0	**Total Capital Costs**	**$182,479**	**$182,479**	**1**	**$182,479**	
1	Re-injection and Total Annual O&M Costs	$106,431	$106,431	0.935	$99,468	Reinjection at Year 1
2	Total Annual O&M Costs	$22,690	$22,690	0.873	$19,818	
3	Total Annual O&M Costs	$22,690	$22,690	0.816	$18,522	
4	Total Annual O&M Costs	$22,690	$22,690	0.763	$17,310	
5	Total Annual O&M Costs	$22,690	$22,690	0.713	$16,178	
	TOTAL SUBSEQUENT YEARS				$171,296	
	Total Present Value				**$353,774**	

TOTAL PRESENT VALUE OF ALTERNATIVE 3	**$354,000**
TOTAL PRESENT VALUE OF ALTERNATIVE 3 (+50%)	**$531,000**
TOTAL PRESENT VALUE OF ALTERNATIVE 3 (-30%)	**$248,000**

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Alternative 4: AS, LUCs, and LTM

Site: Site 49
Location: Site 49 - Camp Lejeune, NC
Phase: Draft FS
Base Year: 2012

KEY ASSUMPTIONS

1. Nine injection well will be installed to 28 ft bgs, and equipped with a 2.5-ft-long stainless steel Microbubble™ sparger and 40 DPT injections to 10 feet bgs..
2. Two vapor monitoring points will be installed to 5 ft bgs, and screened between 3-5 ft bgs.
3. Well and system installation will take 9 (10-hr) days, DPT injections will take 4 days (10hrs/day)..
4. Utility clearance and surveyor will take 1 (10-hr) day total.
5. Four existing groundwater monitoring wells within the site boundary will be monitored during all sampling events.
6. Each sampling event will take 2 Geologists one (1) (10-hr) day.
7. Monitoring will be conducted semi-annually in years 1 through 3 and annually in years 4 through 10. Assuming AS operation lasts 3 years, RAOs met in 10 years.
8. Groundwater analysis: Site-related COCs (1,1,2,2-PCA, 1,1,2-TCA, PCE, TCE, *cis*-DCE, *trans*-DCE, VC, Benzene) and DO measurement on field.
9. The total number of samples for VOCs is 9 (4 normal GW, 1 trip blank, 1 field duplicate, 1 MS, 1 MSD, 1 equipment blank).
10. Design details are conceptual in nature and presented in this FS to develop costs for alternative comparison.

Alternative 4: AS, LUCs, and LTM

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES
CAPITAL COSTS					
Land Use Controls					
Signs	4	EACH	$294	$1,176	R.S. Means #10-14-19.10 (2100)
Deed Notifications	1	LS	$5,000	$5,000	Engineer's Estimate
SUBTOTAL				**$6,176**	
Utility Locator and Surveyor (Well Installation)					
Private Utility Locator	1	LS	$1,500	$1,500	Engineer's estimate
Surveyor	1	LS	$1,500	$1,500	2-surveyors 1 day on site (Oct. 2009 BOA Rates)
Geologist	10	HR	$80	$800	Navy CLEAN Rate
Geologist (Per Diem)	1	DY	$142	$142	DOD Per Diem
SUBTOTAL				**$3,942**	
AS Well Installation, DPT Injections, and VMPs Construction					
AS wells (9 wells 28 feet deep)					
Drilling costs 28 ft wells, includes well installation and completion	1	LS	$21,000	$ 21,000	Engineer's Estimate
Spargers (Model #2240-A32-30-A00-2-aa)	9	EA	$405	$3,645	Vendor quote (5/20/2011)
Vapor monitoring ports (2 VMP @ 5 feet depth)					
Drilling (4.25-in HSA)	10	LF	$16.73	$167	Option Yr 4 Navy CLEAN BOA Rates
Well Materials	2	EA	$36	$72	Riser/2-ft Screen, 2-inch sched 40 PVC (Option Yr 4 Navy CLEAN BOA Rates)
Annular Materials	10	LF	$12.56	$126	sand/bentonite/concrete (4.25"auger) (Option Yr 4 Navy CLEAN BOA Rates)
Well Completion	2	EA	$281	$562	Installation of flush-mounted covers (Option 2010 Navy CLEAN BOA Rates, assuming 2 drums per well (1 water 1 soil) and one drum for the VMPs
Disposal of Generated Wastes	19	EA	$100	$1,900	
Geologist	90	HR	$80	$7,200	Engineer's estimate
Geologist (per diem)	9	DY	$142	$1,278	DOD Travel Per Diem Allowance, FY2011
Field Monitoring Equipment	9	DY	$100	$900	
SUBTOTAL				**$36,850**	
Baseline Monitoring Event					
Field Work (1 day - 2 Geologists)	20	HR	$80	$1,600	Navy CLEAN Rate
Field Equipment	1	LS	$1,500	$1,500	Engineer's Estimate
Geologists (per diem, 2-person crew)	1	DY	$284	$284	DOD Travel Per Diem Allowance, FY2009
Analytical (VOCs)	1	LS	$990	$990	2009 Navy CLEAN BOA Rates
Data Validation (VOCs)	1	LS	$189	$189	2010 Navy CLEAN BOA Rates
Data Analysis/Interpretation	15	HR	$120	$1,800	Engineer's Estimate
SUBTOTAL				**$6,363**	
AS Equipment					
AS system including 10 to 12 HP blower, manifold panel, control system, skid, trailor/shed	1	LS	$35,000	$35,000	Vendor quote (Dec. 2011)
Electrical Connections	1	LS	$2,025	$2,025	R.S. Means #26-05-33.13 (1800)
Furnish and install 0.5-inch diameter HDPE piping materials (AS)	200	LF	$ 0.80	$160	For AS conveyance (R.S.Means #33-41-13.50)
Vendor start-up assistance and expenses	1	LS	$ 3,000	$3,000	Engineer's Estimate
SUBTOTAL				**$40,185**	
Reporting					
Construction Completion Report	1	LS	$20,000	$20,000	Engineer's Estimate
SUBTOTAL				**$20,000**	
COMBINED SUBTOTAL				**$113,516**	
Contingency	15%	of	$113,516	$17,027	
Project Management	8%	of	$113,516	$9,081	
Remedial Design	15%	of	$113,516	$17,027	
Construction Management	10%	of	$113,516	$11,352	
TOTAL CAPITAL COSTS				**$168,004**	

Alternative 4: AS, LUCs, and LTM

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES
OPERATION AND MAINTENANCE COSTS					
Cost per Land Use Controls Inspection (Years 1-10)					
Annual Inspection (Engineer)	10	HR	$100	$1,000	Navy CLEAN Rate
SUBTOTAL				**$1,000**	
Undefined Scope and Market Allowance	20%	of	$1,000	$200	
SUBTOTAL				**$1,200**	
Project Management	8%	of	$1,200	$96	
Operation and Maintenance Cost				**$1,296**	
Cost per AS Operation and Performance Monitoring (Year 1-3)					
Semi-annual groundwater monitoring					2 events
Field Work (2 days - 2 Geologists)	40	HR	$80	$3,200	Navy CLEAN Rate
Field Equipment	2	LS	$1,500	$3,000	Engineer's Estimate
Geologists (per diem, 2-person crew)	2	DY	$284	$568	DOD Travel Per Diem Allowance, FY2009
Analytical (VOCs)	2	LS	$990	$1,980	2009 Navy CLEAN BOA Rates
Data Validation (VOCs)	2	LS	$189	$378	2010 Navy CLEAN BOA Rates
Data Analysis/Interpretation	20	HR	$120	$2,400	Engineer's Estimate
O&M Trips					
Monthly O&M Labor and Travel	12	LS	$1,250	$15,000	Engineer's Estimate
Quarterly Heavy Maintenance	4	LS	$2,300	$9,200	Engineer's Estimate
O&M Supplies	1	LS	$2,000	$2,000	Engineer's Estimate
Annual Report	1	LS	$20,000	$20,000	Engineer's Estimate
Consumables					
Compressor electrical usage ($0.075/kw-hr)	39,201	kWh	$0.075	$2,940	12-hp air compressor - 8.95 KW
SUBTOTAL				**$60,666**	operate 12 hr/day
Contingency	15%	of	$60,666	$9,100	
Project Management	8%	of	$60,666	$4,853	
Operation and Maintenance Cost				**$74,619**	
Cost per Performance Monitoring (Year 4-10)					
Annual groundwater monitoring					
Field Work (1 day - 2 Geologists)	20	HR	$80	$1,600	Navy CLEAN Rate
Field Equipment	1	LS	$1,500	$1,500	Engineer's Estimate
Geologists (per diem, 2-person crew)	1	DY	$284	$284	DOD Travel Per Diem Allowance, FY2009
Analytical (VOCs, Geochem, CFAs, and CENSUS)	1	LS	$990	$990	2009 Navy CLEAN BOA Rates
Data Validation (VOCs)	1	LS	$189	$189	2010 Navy CLEAN BOA Rates
Data Analysis/Interpretation	15	HR	$120	$1,800	Engineer's Estimate
Annual Report	1	LS	$10,000	$10,000	Engineer's Estimate
SUBTOTAL				**$16,363**	
Contingency	15%	of	$16,363	$2,454	
Project Management	8%	of	$16,363	$1,309	
Operation and Maintenance Cost Years 4-10				**$20,126**	

PRESENT VALUE ANALYSIS Discount Rate : 7.0%

USEPA. 2000. *A Guide to Developing and Documenting Cost Estimates during the Feasibility Study.* EPA/540/R-00/002. July.

END YEAR	DESCRIPTION	TOTAL COST	TOTAL COST PER YEAR	DISCOUNT FACTOR	PRESENT VALUE
0	**Total Capital Costs**	**$168,004**	**$168,004**	**1**	**$168,004**
1	Total Annual O&M Costs	$75,915	$75,915	0.935	$70,949
2	Total Annual O&M Costs	$75,915	$75,915	0.873	$66,307
3	Total Annual O&M Costs	$75,915	$75,915	0.816	$61,969
4	Total Annual O&M Costs	$21,422	$21,422	0.763	$16,343
5	Total Annual O&M Costs	$21,422	$21,422	0.713	$15,274
6	Total Annual O&M Costs	$21,422	$21,422	0.666	$14,275
7	Total Annual O&M Costs	$21,422	$21,422	0.623	$13,341
8	Total Annual O&M Costs	$21,422	$21,422	0.582	$12,468
9	Total Annual O&M Costs	$21,422	$21,422	0.544	$11,652
10	Total Annual O&M Costs	$21,422	$21,422	0.508	$10,890
	TOTAL SUBSEQUENT YEARS				$293,469
	TOTAL				**$461,472**

TOTAL PRESENT VALUE OF ALTERNATIVE 4	**$462,000**
TOTAL PRESENT VALUE OF ALTERNATIVE 4 (+50%)	**$693,000**
TOTAL PRESENT VALUE OF ALTERNATIVE 4 (-30%)	**$324,000**

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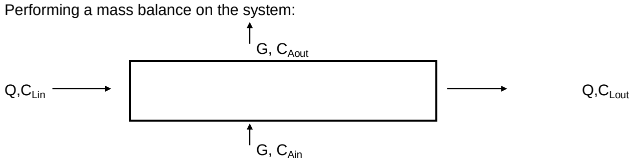
Appendix I
Air Sparging Calculations

Appendix I
Property Boundary Air Sparging Barrier Design - Wells
Site 49
MCIEAST-MCB CAMLEJ
North Carolina

Performing a mass balance on the system:



$Q(C_{Lin}-C_{Lout})=G(C_{Aout}-C_{Ain})$ and assume that C_{Ain} = 0
We need to determine G for the design.
where: Q = groundwater flow rate (gpm)
G = air flow rate (gpm)
C = concentration

Assuming the sparging air is an ideal gas:
pV=nRT ⟶ p/RT=n/V ⟶ C_{Aout} = n/V = p/RT

The Henry's Law Constant equation can be substituted for p
H (atm-m^3/mol) = P/C_{Lout} ⟶ p=HC_{Lout}

Compiling all equations into one and assuming influent air is contaminant free (C_{Ain} = 0) shows:
$Q(C_{Lin} - C_{Lout}) = GHC_{Lout}/RT$

Solving for G, the required air flow rate:
$G = QRT(C_{Lin} - C_{Lout})/HC_{Lout}$

Using this equation, solve for the greatest required air flow rate with all data considered.

ROW 1

Q =	0.1 gpm	7.2275E-06 m^3/s	Avg. Sat Thickness	20 ft	GW flow velocity	0.063 ft/d
T =	60 °F	293 °K	Length	50 ft	Porosity	0.35
R =	8.20E-05 atm-m^3/mol-°K				# of AS/B wells	3

Contaminant	Max. (µg/L)	Max. (g/m^3)	Effluent (µg/L)	Goal (g/m^3)	% Red.	H (atm-m^3/mol)	G (m^3/s)	G (cfm)	
cis -DCE	70	0.07	60	0.06	14.3%	0.00408	0.00	0.02	Row 1

Henry's Constant taken from Toxicological Profile for Carbon Tetrachloride (ASTDR, August 2005)

This represents a theoretical air flow rate of

0.015	cfm	assuming ideal mixing and gas transfer	------->	0.005	cfm	per well
0.030	cfm	assuming 50% transfer efficiency	------->	0.010	cfm	per well
0.060	cfm	assuming 25% transfer efficiency	------->	0.020	cfm	per well
0.150	cfm	assuming 10% transfer efficiency	------->	0.050	cfm	per well

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Q =	0.1 gpm	7.2275E-06 m^3/s	Avg. Sat Thickness	20 ft	GW flow velocity	0.063 ft/d
T =	60 °F	293 °K	Length	50 ft	Porosity	0.35
R =	8.20E-05 atm-m^3/mol-°K				# of AS/B wells	3

Contaminant	Max. (µg/L)	Max. (g/m^3)	Effluent (µg/L)	Goal (g/m^3)	% Red.	H (atm-m^3/mol)	G (m^3/s)	G (cfm)	
PCA	1	0.001	0.2	0.0002	80.0%	0.000345	0.00	4	Row 1

Henry's Constant taken from Toxicological Profile for Carbon Tetrachloride (ASTDR, August 2005)

This represents a theoretical air flow rate of

4.266	cfm	assuming ideal mixing and gas transfer	------->	1.422	cfm	per well
8.532	cfm	assuming 50% transfer efficiency	------->	2.844	cfm	per well
17.064	cfm	assuming 25% transfer efficiency	------->	5.688	cfm	per well
42.660	cfm	assuming 10% transfer efficiency	------->	14.220	cfm	per well

---

Q =	0.1 gpm	7.2275E-06 m^3/s	Avg. Sat Thickness	20 ft	GW flow velocity	0.063 ft/d
T =	60 °F	293 °K	Length	50 ft	Porosity	0.35
R =	8.20E-05 atm-m^3/mol-°K				# of AS/B wells	3

Contaminant	Max. (µg/L)	Max. (g/m^3)	Effluent (µg/L)	Goal (g/m^3)	% Red.	H (atm-m^3/mol)	G (m^3/s)	G (cfm)	
TCE	100	0.1	3	0.003	97.0%	0.0103	0.00	1.16	Row 1

Henry's Constant taken from Toxicological Profile for Carbon Tetrachloride (ASTDR, August 2005)

This represents a theoretical air flow rate of

1.155	cfm	assuming ideal mixing and gas transfer	------->	0.385	cfm	per well
2.310	cfm	assuming 50% transfer efficiency	------->	0.770	cfm	per well
4.620	cfm	assuming 25% transfer efficiency	------->	1.540	cfm	per well
11.550	cfm	assuming 10% transfer efficiency	------->	3.850	cfm	per well

---

Q =	0.1 gpm	7.2275E-06 m^3/s	Avg. Sat Thickness	20 ft	GW flow velocity	0.063 ft/d
T =	60 °F	293 °K	Length	50 ft	Porosity	0.35
R =	8.20E-05 atm-m^3/mol-°K				# of AS/B wells	3

Contaminant	Max. (µg/L)	Max. (g/m^3)	Effluent (µg/L)	Goal (g/m^3)	% Red.	H (atm-m^3/mol)	G (m^3/s)	G (cfm)	
VC	2	0.002	0.03	0.00003	98.5%	0.027	0.00	1	Row 1

Henry's Constant taken from Toxicological Profile for Carbon Tetrachloride (ASTDR, August 2005)

This represents a theoretical air flow rate of

0.895	cfm	assuming ideal mixing and gas transfer	------->	0.298	cfm	per well
1.790	cfm	assuming 50% transfer efficiency	------->	0.597	cfm	per well
3.579	cfm	assuming 25% transfer efficiency	------->	1.193	cfm	per well
8.949	cfm	assuming 10% transfer efficiency	------->	2.983	cfm	per well

Appendix J
SiteWise Evaluation

APPENDIX J
Sustainability Analysis for Site 49

Introduction

This appendix presents the approach taken and results obtained from a sustainability analysis that was completed for Site 49 located on Marine Corps Base Camp Lejeune (MCB CamLej) in Onslow County, North Carolina. Site 49 is identified as a suspected minor dump site where paint and paint-related wastes may have been disposed.

Alternatives are presented to address Site 49 COCs in groundwater. A detailed summary of the remedial alternatives is provided in Section 9 of the Site 49 Remedial Investigation/Feasibility Study (RI/FS). A sustainability analysis was performed by CH2M HILL using SiteWise™ Version 2.0 (Battelle, 2011) for the following remedial alternatives:

- Alternative 1 - No Action
- Alternative 2 – Monitored Natural Attenuation (MNA) and Land Use Controls (LUCs)
- Alternative 3 – Enhanced *in situ* Biodegradation (EISB) with LUCs and LTM
- Alternative 4 – Air Sparging (AS) with LUCs and LTM

Method and Assumptions

The SiteWise™ tool consists of a series of Excel-based spreadsheets used to conduct a baseline assessment of sustainability metrics. The assessment is carried out using a spreadsheet-based building block approach, where every remedial alternative is first broken down into modules that mirror the phases of remedial action work, specifically: remedial investigation (RI), remedial action construction (RAC), remedial action operation (RAO), and long-term monitoring (LTM).

SiteWise™ uses various emission factors from governmental or non-governmental research sources to determine the environmental impact of each activity. The quantitative metrics calculated by the tool include:

1) Greenhouse gases (GHGs) reported as carbon dioxide equivalents (CO_2e), consisting of carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O);
2) Energy usage (expressed as British Thermal Units [BTU]);
3) Water usage (gallons of water);
4) Air emissions of criteria pollutants consisting of nitrogen (NO_x), sulfur oxides (SO_x), and particulate matter (PM_{10}); and
5) Accident risk (risk of injury and risk of fatality).

For the purpose of this discussion the term footprint will be used to describe the quantified emissions or quantities for each metric. To estimate the sustainability footprint for each remedial alternative, only those elements of the RI, RAC, RAO, and LTM possessing important sustainability elements were included in the assessment. The No Action alternative is not analyzed because there are no impacts to environmental and social metrics. The footprints of each remedial phase are combined into overall footprints for each remedial action.

A lower environmental footprint indicates lower deleterious impacts to environmental and social metrics, which collectively make up the SiteWise™ sustainability metrics. Conversely, a higher environmental footprint indicates higher deleterious impacts associated with the SiteWise™ metrics. The major conclusions of this sustainability analysis are incorporated into the short-term effectiveness criteria evaluation of the RI/FS report.

Detailed assumptions for groundwater alternatives are provided in **Tables J-1** through **J-3**. The following is a description of the major activities for each alternative covered under the respective remedial action phase.

- RI: No actions for any alternative.
- RAC: Transportation of personnel, materials, equipment, material use, water consumption, equipment use, onsite labor hours, and residual handling.

  - Alternative 2 involves personnel transportation and onsite labor hours to survey LUCs
  - Alternative 3 involves 40 DPT injections of lactate in the shallow aquifer target zone, construction of 6 injection wells to 25 feet bgs using hollow stem auger (HSA) drilling methods, transportation of personnel and equipment for injections, pumps, onsite labor, and materials for two injection events of 340 lbs of 60 percent sodium lactate (204 lbs dry weight) per injection. 1 year of quarterly groundwater sampling using low-flow methods is also accounted for during this phase.
  - Alternative 4 involves construction of 9 AS wells to 28 feet bgs using HSA drilling methods and transportation of AS system components.
- RAO: Transportation of personnel, equipment, water consumption, equipment use, onsite labor hours, and residual handling.
  - Alternative 2 and 3 have no activities during this phase
  - Alternative 4 involves personnel transportation and onsite labor hours for monthly operations and maintenance (O&M) trips and 3 years of semi-annual groundwater sampling using low-flow methods. Electricity for operating the AS system for 3 years (12 hp, 8.34 kWh compressor operating 12 hours per day) is also included during this phase.
- LTM: Transportation of personnel, onsite labor hours, and residuals handling
  - Alternative 2 involves 30 years of biennial groundwater sampling using low flow methods
  - Alternative 3 involves 3 years of annual groundwater sampling using low flow methods
  - Alternative 4 involves 7 years of annual groundwater sampling using low flow methods

General Assumptions

The specific assumptions made for the individual remedies are presented in **Tables J-1** through **J-3**. The following overall assumptions are used for the SiteWise™ tool evaluation:

- Distance to IDW landfill and waste water treatment plant (WWTP): Assume all non-hazardous waste will be transported to a landfill/WWTP located 200 miles away from MCB CamLej.
- IDW volume assumptions are as follows:
  - Soil = 1 drum (650 lbs) per 30 feet of drilling
  - Development water = 50 gallons per well (monitoring wells or vertical injection wells).
  - Purge water from low-flow sampling = 8 gallons per well
- The distances per trip for materials shipped onsite and IDW shipped offsite were included at full weight going one way and empty weight going one way.
- The complete environmental footprint for production of equipment used, or production of the vehicles used for transportation, is not considered in this analysis.
- For materials being shipped onsite, the transportation of these materials was captured using the EQUIPMENT TRANSPORTATION sections.
- The following average distances traveled were used unless specific distances were known:
  - Oversight/Monitoring Support – 500 miles roundtrip
  - Utility Location – 250 miles roundtrip
  - Surveying – 250 miles roundtrip
  - O&M Inspections – 50 miles roundtrip
  - Injection Well Drillers/Rig – 800 miles roundtrip
  - Injection Support – 500 miles roundtrip

Results and Conclusions

The overall quantitative footprints for each alternative are provided along with the relative impact of each alternative in each footprint (**Table J-4**). The relative impact is a qualitative assessment of the relative footprint of each alternative, a rating of high, medium, or low is assigned to each alternative based on its performance against the other alternatives. The tool assigns a ranking of high to the highest footprint in each category and assigns the rankings of other alternatives based on the difference in the data between alternatives. The ranking is based on a 30 percent difference, if the footprints of two alternatives are within 30 percent of each other they will be given the same rating and there is essentially no difference between the alternatives. This allows for some uncertainty inherent in the assumptions used in the model.

It should be noted that while this analysis compares the environmental footprints of each of the alternatives, the alternatives provide different end-uses. Therefore, a comparison of the results of the alternatives needs to be made in the context of the benefits (e.g., ARAR compliance, contaminant reduction, cost effectiveness, and etc.) of each of the alternatives.

A comparative analysis for remedial alternatives 2, 3 and 4 is summarized in **Figure J-1**. **Table J-4** presents a comparison of the quantitative environmental footprint metrics evaluated for each of the remedial alternatives. Overall, Alternative 2 had the lowest footprints in all categories with the exception of the accident risk fatality footprint. Alternative 4 had the largest GHG, total energy, water use, and SO_X footprints compared with the other alternatives. Alternative 3 had low GHG, total energy, NO_X, and SO_X footprints and similar water use, PM_{10}, and accident risk footprints to Alternative 4. All alternatives had similar (high) accident risk footprints, although Alternative 2 had a slightly lower accident risk injury footprint than Alternative 3 and 4. The footprints for each alternative are discussed below.

- Alternative 1— No Action

This alternative has no sustainability impacts because no action occurs.

- Alternative 2 –MNA and LUCs

Personnel and IDW transportation accounted for all of the GHG, total energy, SO_X, NO_X, and PM_{10} footprints. In addition to personnel and IDW transportation, onsite labor hours contributed to the accident risk fatality and injury footprints. There was negligible water consumption associated alternative so it was not tracked in SiteWise™. Results are provided in **Table J-5** and **Figure J-2**.

- Alternative 3 – EISB, LUCs, and LTM

The RAC phase (injection well installation and injection activities) had the highest proportion of the overall footprints because the activities are heavily equipment and material intensive. Transportation of personnel, equipment, and residuals (IDW) contributed to the majority of GHG and total energy from the RAC and LTM phases. Water for dilution of the EISB substrate was the primary contributor to the water use footprint. Drilling and the use of pumps during injections contributed to the majority of the total PM_{10}, SO_X, and NO_X footprints. Transportation of personnel, materials, and IDW accounted for the majority of the accident risk fatality footprint, and onsite labor hours contributed to the majority of the accident risk injury footprint. Results are provided in **Table J-6** and **Figure J-3**.

- Alternative 4 – AS with LUCs and LTM

Electricity used to power the AS system during the RAO phase was the primary contributor to GHG, total energy, SO_X, and water footprints. Drilling contributed to the majority of the PM_{10} emissions and approximately one-third of the NO_x footprint, with the remaining portion of NO_X impacts from electricity use. Transportation of personnel, materials, and IDW accounted for the majority of the accident risk fatality footprint, and onsite labor hours contributed to the majority of the accident risk injury footprint. Results are provided in **Table J-7** and **Figure J-4**.

Uncertainty Assessment

A generic EISB substrate (Vegetable Oil) was used in the SiteWise™ tool, however there is a wide range of products that use different types of substrates (emulsified vegetable oil, molasses, or sodium lactate for example) that have different feedstocks (corn, soybeans, sorghum) that have different life-cycle impacts. SiteWise™ does not account for the water use, NO_X, SO_X, and PM_{10} footprints for chemical manufacturing which may underestimate the overall footprints for alternatives involving substrate or chemical injection.

Recommendations

The estimates from the SiteWise tool were used to estimate the environmental footprint of the alternatives. Once the alternative is selected, it is recommended the footprint of the selected alternative be further evaluated in the design phase of the projects to explore opportunities to optimize the environmental footprint of the project and integrate sustainable remediation best practices in the design, construction, and operation of the alternative.

TABLE J-1

Alternative 2 - Monitored Natural Attenuation and Land Use Controls Assumptions

Site 49 Remedial Investigation/Feasibility Study

MCIEAST-MCB CAMLEJ, North Carolina

Sitewise Tab	Assumptions
Remedial Investigation	No Actions
Remedial Action Construction	**LUC Installation and Survey**
Labor Hours Onsite	40 hours
Personnel Transportation - Road	LUC install Oversight - 1 driver, 500 miles R/T from Charlotte (1 trip) LUC install Surveying - 2 people, 250 miles R/T from Raleigh (1 trip)
Remedial Action Operations	No Actions
Longterm Monitoring	**Biennial GW sampling, for 30 years**
Labor Hours Onsite	750 hours
Personnel Transportation - Road	Inspections: Local travel - 1 person, 50 mile R/T (30 trips) Monitoring - 2 people, 2 vehicles, 500 miles R/T, 30 total trips
Residual Handling	Low-flow sampling - 8 gallons per well, 4 wells, 1 drum per event , 15 trips to landfill 200 miles away, 0.225 tons each trip, 480 gallons treated at wastewater treatment plant

Notes:

R/T = round trip

TABLE J-2

Alternative 3 Enhanced *in-situ* Bioremediation Assumptions

Site 49 Remedial Investigation/Feasibility Study

MCIEAST-MCB CAMLEJ, North Carolina

GENERAL ASSUMPTIONS/CONVERSIONS

Install 6 injection wells to 25 feet bgs

2 injections of EISB Substrate

SITEWISE TAB	Assumptions
Remedial Investigation	No Actions
Remedial Action Construction	**Construction of injection wells, Injection Activities, 1 Year Quarterly Performance Monitoring**
Labor Hours Onsite	900 hours
Material Production	Injection wells: 150 ft of 2 inch schedule 40 PVC
	Lactate - 340 lb of 60% solution per injection = 204 lbs dry weight, 2 injections (proxy EVO in SiteWise), 10 lbs for DPT injections
Personnel Transportation - Road	Drilling support, 1 heavy duty vehicles, 2 people, 800 miles R/T.
	Drilling/Injection Oversight - 1 person 500 miles R/T, 3 trips
	Utility Locate- 1 person, 250 miles R/T
	Surveying - 2 people, 250 miles R/T
	Injection support crew - 2 people, 2 vehicles, 500 miles roundtrip (4 trips total)
	Field staff - 2 people, 2 vehicles, 500 miles roundtrip from Charlotte (8 trips)
Equipment and Material Transportation - Road	Drill rig - 800 miles R/T, weighs 10 tons.
	Drilling Supplies, 800 miles and 2 tons.
	Lactate - 0.25 tons of lactate delivered to the site 500 miles one way, 2 events, 2 full and empty trips (1,000 miles each)
	Assume tanks, pumps, and associated injection equipment weigh a total of 5 tons transported from Charlotte, NC (500 miles roundtrip) 2 trip, 1000 miles total
Equipment Use - Drilling Injection Wells	6 drilling locations, HSA drilling method, 5 hour drilling at each injection well, diesel powered rig
	40 DPT injection points, 1 hour at each point, diesel powered rig
Equipment Use - Pumps	6.5 hp gasoline pump running 10 hrs per day for 7 days each injection (140 total hours)
Residual Handling	Soil IDW - 345 feet of boring = 12 drums (650 lbs per drum x 12 drums = 7,800 lbs = 3.9 tons), 200 miles per trip (one way), 1 trip, non hazardous
	Water IDW - 1 drum (50 gallons) per well for development = 21 drums at 450 lbs = 4.7 tons, 200 miles 1 way (Soil and Water transported in same trip), 1,050 gals to WWTP
	8 gallons of IDW per well generated during low-flow sampling x 4 wells = 32 gallons per event. approx 1 drum, (0.225 tons) to WWTP 200 miles away (4 trips full and empty)
	Water Consumption - 500 gallons for decontamination, 23,970 gallons dilution water per injection = 48,440 gallons total
Remedial Action Operations	No Actions
Longterm Monitoring	**Annual sampling in years 2 - 5 (assume LUC inspections are completed during sampling)**
Labor Hours Onsite	240 hours
Personnel Transportation - Road	Field staff - 2 people, 2 vehicles, 500 miles R/T from Charlotte (8 trips)
Resource Consumption - Water	8 gallons of IDW per well generated during low-flow sampling x 4 wells = 32 gallons per event (approx 1 drum, 0.225 tons) to WWTP 200 miles away (4 trips full and empty)

Notes:

ft = feet	WWTP = wastewater treatment plant
IDW = investigation derived waste	PVC = polyvinyl chloride
in = inch	R/T = round trip
hp = Horsepower	EISB = enhanced *in situ* biodegradation
hrs = hours	lb = pound
LTM = long term monitoring	

TABLE J-3

Alternative 4 - Air Sparging with Land Use Controls and Long-term Monitoring Assumptions

Site 49 Remedial Investigation/Feasibility Study

MCIEAST-MCB CAMLEJ, North Carolina

GENERAL ASSUMPTIONS/CONVERSIONS

Install 9 vertical injection wells 28 feet deep, 2 inch diameter Schedule 40 PVC
Install 2 vapor monitoring points to 5 feet
Operate for 3 years

SITEWISE TAB	Assumptions
Remedial Investigation	No Actions
Remedial Action Construction	**Construction of AS wells**
Labor Hours Onsite	360 hours
Material Production	Injection wells: 270 ft of 2 inch schedule 40 PVC
	Conveyance piping: 200 ft of 3/4 inch schedule 40 HDPE pipe
Personnel Transportation - Road	Drilling support, 1 heavy duty vehicle, 2 people, 800 miles R/T.
	Drilling Oversight - 1 person 500 miles R/T
	Utility Locate- 1 person, 250 miles R/T
	Surveying - 2 people, 250 miles R/T
	Electricians - 300 miles R/T, 2 people
Equipment Transportation - Road	Drill rig - 800 miles R/T, weighs 10 tons.
	Drilling Supplies, 800 miles and 2 tons.
	Air Sparge System Supplies (compressor, housing, control panel, etc) - 800 miles one way, 5 tons.
	Empty - 800 miles back, 0 tons. (1 trip for AS system supplies)
Equipment Use - Drilling Injection Wells	9 drilling locations 5 hours at each, diesel powered rig
Residual Handling	Soil IDW - 9 drums, 5,850 lb, 3 tons, 200 miles per trip (one way), 1 trip. Non hazardous landfill
	Water IDW - 1 drum (450 lbs) per well for development plus 5 drums of decontamination water, 6300 lbs = 3.15 tons, 200 miles one way (soil and water in one trip), 900 gallons to WWTP
Resource Consumption - Water	Water Consumption 250 gallons for decontamination
Remedial Action Operations	**Operating system for 3 years, Performance Monitoring**
Labor Hours Onsite	440 hours
Personnel Transportation - Road	Monthly O&M - 50 miles roundtrip, 1 person. (36 trips total) Semi annual monitoring 4 wells for 3 years, 2 people, 2 trucks, driving from Charlotte (500 miles roundtrip). (12 trips total).
Equipment Use	Power for compressor/blower for the AS, 117,470 kw-hr
Residual Handling	8 gallons of IDW per well generated during low-flow sampling x 4 wells = 32 gallons per event. approx 1 drum, (0.225 tons) to landfill 200 miles away (6 trips full and empty)
Longterm Monitoring	**Annual sampling in years 4-10 (7 events)**
Labor Hours Onsite	390 hours
Personnel Transportation - Road	Field staff - 2 people, 2 vehicles, 500 miles R/T from Charlotte (14 trips)
Residual Handling	8 gallons of IDW per well generated during low-flow sampling x 4 wells = 32 gallons per event (approx 1 drum, 0.225 tons) to WWTP 200 miles away (7 trips full and empty, 224 gallons total)

Notes:

AS = air sparge	ft = feet
HDPE - high density polyethylene	IDW = investigation derived waste
kw-hr = kilowatt hour	lb = pound
O&M = operations and maintenance	PVC = polyvinyl chloride
R/T = round trip	WWTP = wastewater treatment plant

TABLE J-4

Relative Impact of Alternatives

Site 49 Remedial Investigation/Feasibility Study

MCIEAST-MCB CAMLEJ, North Carolina

Remedial Alternatives	GHG Emissions	Total energy Used	Water Used	NO_x emissions	SO_x Emissions	PM10 Emissions	Accident Risk Fatality	Accident Risk Injury
	metric ton	MMBTU	gallons	metric ton	metric ton	metric ton		
Alternative 1- No Action	0	0	0	0	0	0	0	0
Alternative 2 - MNA and LUCs	17.9	229	0	6.64E-03	2.20E-04	7.98E-04	2.26E-04	3.29E-02
Alternative 3 - EISB, LUCs, and LTM	23.7	306	48440	3.90E-02	4.34E-03	4.65E-03	2.74E-04	4.17E-02
Alternative 4 - AS, LUCs, and LTM	91.7	1561	60160	1.33E-01	3.19E-01	5.06E-03	2.92E-04	4.54E-02

Remedial Alternatives	GHG Emissions	Total energy Used	Water Used	NO_x emissions	SO_x Emissions	PM10 Emissions	Accident Risk Fatality	Accident Risk Injury
	metric ton	MMBTU	gallons	metric ton	metric ton	metric ton		
Alternative 1- No Action	Low	Low	Low	Low	Low	Low	Low	Low
Alternative 2 - MNA and LUCs	Low	Low	Low	Low	Low	Low	High	High
Alternative 3 - EISB, LUCs, and LTM	Low	Low	High	Low	Low	High	High	High
Alternative 4 - AS, LUCs, and LTM	High	High	High	High	High	High	High	High

The relative impact is a qualitative assessment of the relative footprint of each alternative, a rating of High for an alternative is assigned if it is at least 70 percent of the maximum footprint, a rating of Medium is assigned if it is between 30 and 70 percent of the maximum footprint, and a rating of Low is assigned if it is less than 30 percent of the maximum footprint.

Notes:

MMBTU - million British Thermal Unit

NOx - Nitrogen Oxides

SOx - Sulfur Oxides

AS - air sparge

LUCs - land use controls

PM10 - Particulate Matter

GHG - Greenhouse Gases

LTM - long-term monitoring

EISB - Enhanced *in situ* bioremediation

TABLE J-5

Alternative 2 - Land Use Controls and Long-term Monitoring Results

Site 49 Remedial Investigation/Feasibility Study

MCIEAST-MCB CAMLEJ, North Carolina

Phase	Activities	GHG Emissions	Total Energy Used	Water Used	NO_x Emissions	SO_x Emissions	PM_{10} Emissions	Accident Risk Fatality	Accident Risk Injury
		metric ton	MMBTU	gallons	metric ton	metric ton	metric ton		
Remedial Action Construction	Consumables	0.00	0.00	NA	NA	NA	NA	NA	NA
	Transportation-Personnel	0.29	3.60	NA	1.1E-04	3.7E-06	2.1E-05	7.8E-06	6.3E-04
	Transportation-Equipment	0.00	0.00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	0.00	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.1E-06	9.2E-04
	Residual Handling	0.00	0.00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Sub-Total	0.29	3.60	0.00E+00	1.06E-04	3.73E-06	2.15E-05	9.94E-06	1.55E-03
Longterm Monitoring	Consumables	0.00	0.00	NA	NA	NA	NA	NA	NA
	Transportation-Personnel	9.09	114.69	NA	3.8E-03	1.2E-04	5.4E-04	1.3E-04	1.0E-02
	Transportation-Equipment	0.00	0.00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	0.05	0.01	0.0E+00	1.0E-04	5.0E-05	1.1E-06	4.0E-05	1.7E-02
	Residual Handling	8.45	110.32	NA	2.7E-03	4.7E-05	2.4E-04	4.7E-05	3.8E-03
	Sub-Total	17.59	225.01	0.00E+00	6.54E-03	2.16E-04	7.77E-04	2.16E-04	3.14E-02
Total		**17.9**	**228.6**	**0.0E+00**	**6.6E-03**	**2.2E-04**	**8.0E-04**	**2.3E-04**	**3.3E-02**

Notes:

MMBTU - million British Thermal Unit

NOx - Nitrogen Oxides

SOx - Sulfur Oxides

PM10 - Particulate Matter

NA - Not Applicable

GHG - Greenhouse Gases

TABLE J-6

Alternative 3 - Enhanced *in-situ* Bioremediation Results

Site 49 Remedial Investigation/Feasibility Study

MCIEAST-MCB CAMLEJ, North Carolina

Phase	Activities	GHG Emissions	Total Energy Used	Water Used	NO_x Emissions	SO_x Emissions	PM_{10} Emissions	Accident Risk Fatality	Accident Risk Injury
		metric ton	MMBTU	gallons	metric ton	metric ton	metric ton		
Remedial Action Construction	Consumables	0.21	5	NA	NA	NA	NA	NA	NA
	Transportation-Personnel	5.19	66	NA	2.0E-03	5.9E-05	2.8E-04	7.7E-05	6.2E-03
	Transportation-Equipment	6.79	89	NA	2.1E-03	3.8E-05	1.9E-04	3.6E-05	2.9E-03
	Equipment Use and Misc	4.17	52	4.8E+04	3.2E-02	4.0E-03	3.2E-03	8.9E-05	2.2E-02
	Residual Handling	2.90	38	NA	1.1E-03	1.5E-04	7.9E-04	1.6E-05	1.3E-03
	Sub-Total	19.26	249	4.84E+04	3.74E-02	4.29E-03	4.46E-03	2.17E-04	3.26E-02
Longterm Monitoring	Consumables	0.00	0	NA	NA	NA	NA	NA	NA
	Transportation-Personnel	2.20	28	NA	9.2E-04	2.9E-05	1.3E-04	3.1E-05	2.5E-03
	Transportation-Equipment	0.00	0	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	0.01	0	0.0E+00	2.8E-05	1.3E-05	3.0E-07	1.3E-05	5.5E-03
	Residual Handling	2.25	29	NA	7.1E-04	1.3E-05	6.3E-05	1.2E-05	1.0E-03
	Sub-Total	4.47	57	0.00E+00	1.65E-03	5.47E-05	1.94E-04	5.65E-05	9.04E-03
Total		**23.7**	**306**	**4.84E+04**	**3.90E-02**	**4.34E-03**	**4.65E-03**	**2.74E-04**	**4.17E-02**

Notes:

MMBTU - million British Thermal Unit

NOx - Nitrogen Oxides

SOx - Sulfur Oxides

PM10 - Particulate Matter

NA - Not Applicable

GHG - Greenhouse Gases

TABLE J-7

Alternative 4 - Air Sparging with Enhanced *in-situ* Bioremediation, Land Use Controls, and Long-term Monitoring

Site 49 Remedial Investigation/Feasibility Study

MCIEAST-MCB CAMLEJ, North Carolina

Phase	Activities	GHG Emissions	Total Energy Used	Water Used	NO_x Emissions	SO_x Emissions	PM_{10} Emissions	Accident Risk Fatality	Accident Risk Injury
		metric ton	MMBTU	gallons	metric ton	metric ton	metric ton		
Remedial Action Construction	Consumables	0.31	7	NA	NA	NA	NA	NA	NA
	Transportation-Personnel	1.84	24	NA	6.5E-04	1.6E-05	7.4E-05	2.7E-05	2.2E-03
	Transportation-Equipment	4.80	63	NA	1.5E-03	2.7E-05	1.3E-04	2.5E-05	2.0E-03
	Equipment Use and Misc	3.92	46	2.5E+02	3.9E-02	4.9E-03	3.6E-03	3.7E-05	9.3E-03
	Residual Handling	0.62	8	NA	3.8E-04	1.1E-04	5.6E-04	3.1E-06	2.5E-04
	Sub-Total	11.49	148	2.50E+02	4.14E-02	5.07E-03	4.37E-03	9.20E-05	1.37E-02
Remedial Action Operations	Consumables	0.00	0	NA	NA	NA	NA	NA	NA
	Transportation-Personnel	4.30	54	NA	1.8E-03	5.6E-05	2.6E-04	6.1E-05	4.9E-03
	Transportation-Equipment	0.00	0	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	64.71	1215	6.0E+04	8.6E-02	3.1E-01	4.6E-07	2.4E-05	1.0E-02
	Residual Handling	3.34	45	NA	1.1E-03	3.1E-05	9.0E-05	1.9E-05	1.5E-03
	Sub-Total	72.34	1313	5.99E+04	8.84E-02	3.14E-01	3.46E-04	1.03E-04	1.65E-02
Longterm Monitoring	Consumables	0.00	0	NA	NA	NA	NA	NA	NA
	Transportation-Personnel	3.86	49	NA	1.6E-03	5.0E-05	2.3E-04	5.5E-05	4.4E-03
	Transportation-Equipment	0.00	0	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	0.02	0	0.0E+00	4.9E-05	2.3E-05	5.3E-07	2.1E-05	9.0E-03
	Residual Handling	3.94	51	NA	1.2E-03	2.2E-05	1.1E-04	2.2E-05	1.8E-03
	Sub-Total	7.82	100	0.00E+00	2.89E-03	9.57E-05	3.40E-04	9.73E-05	1.51E-02
Total		**91.7**	**1561**	**60160**	**1.3E-01**	**3.2E-01**	**5.1E-03**	**2.9E-04**	**4.5E-02**

Notes:

MMBTU - million British Thermal Unit

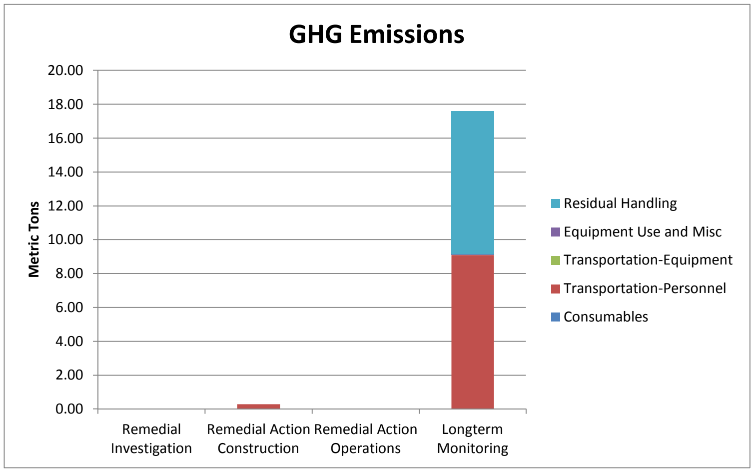
NOx - Nitrogen Oxides

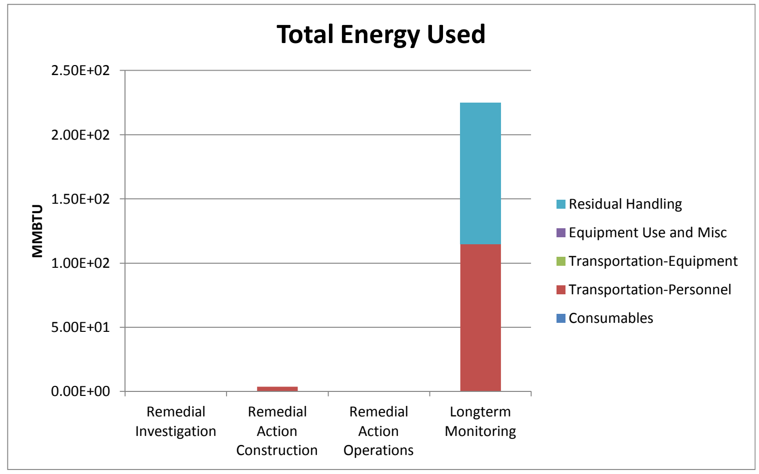
SOx - Sulfur Oxides

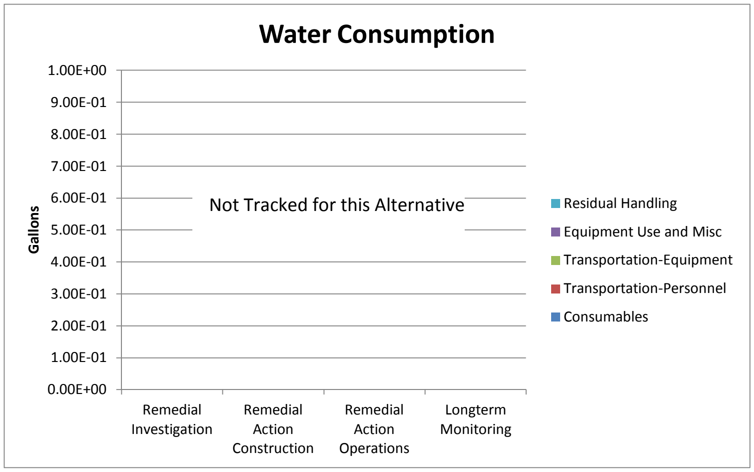
PM10 - Particulate Matter

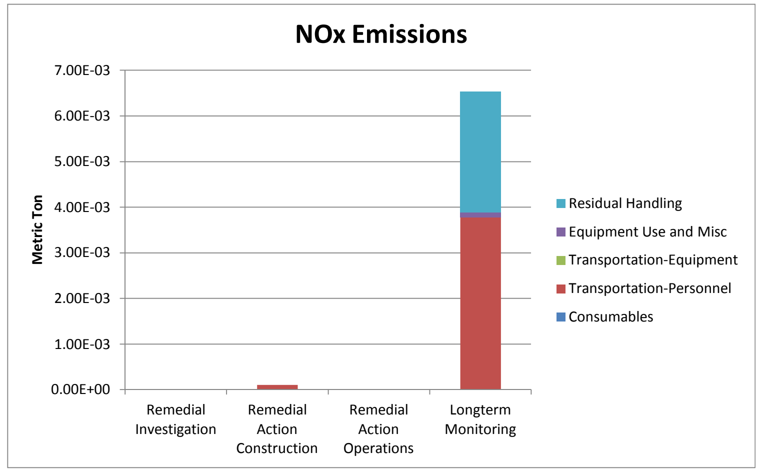
NA - Not Applicable

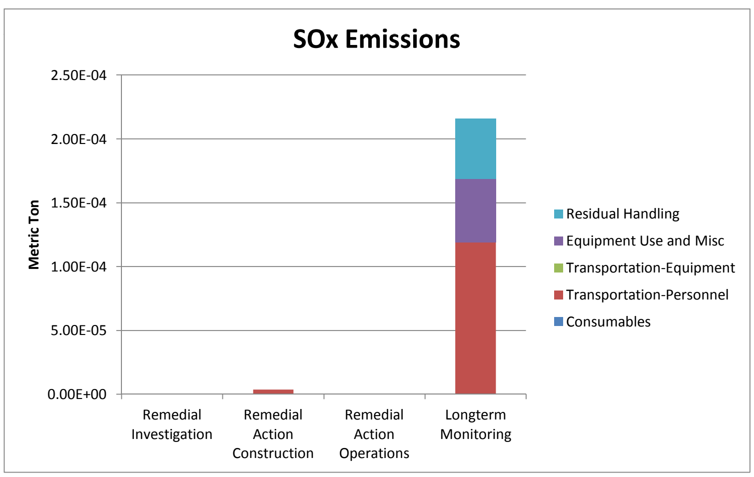
GHG - Greenhouse Gases

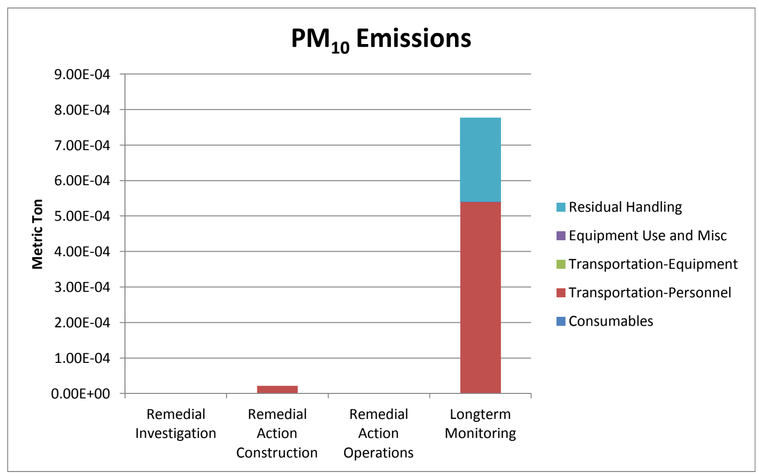


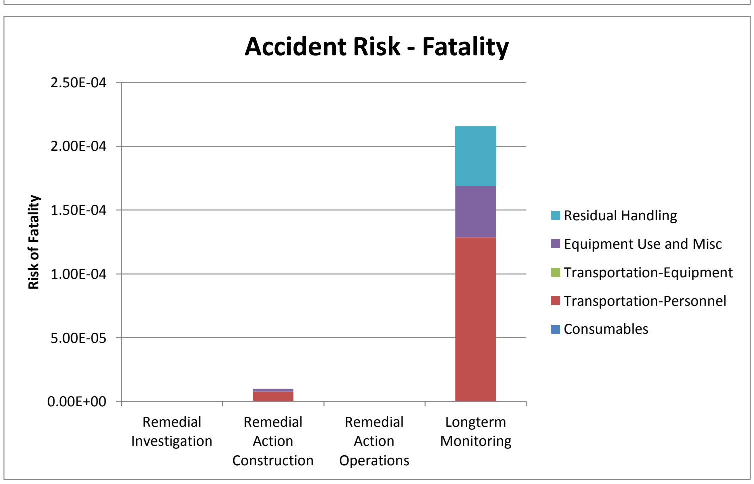












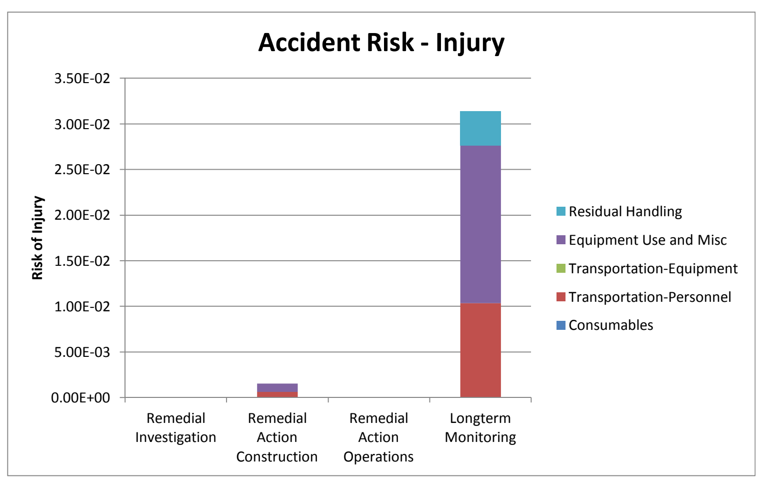
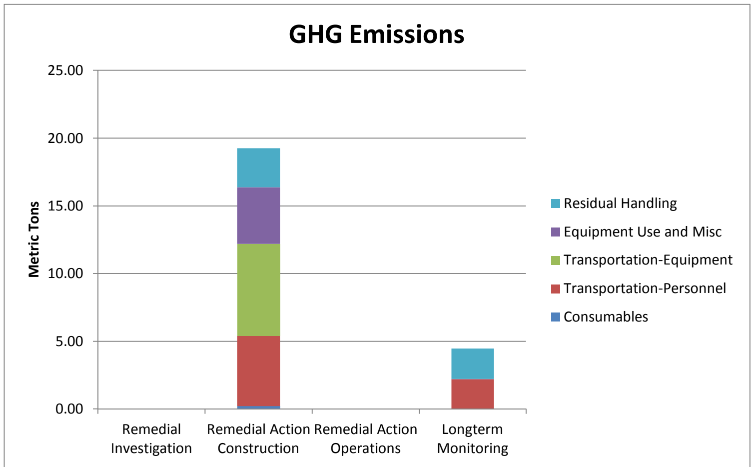
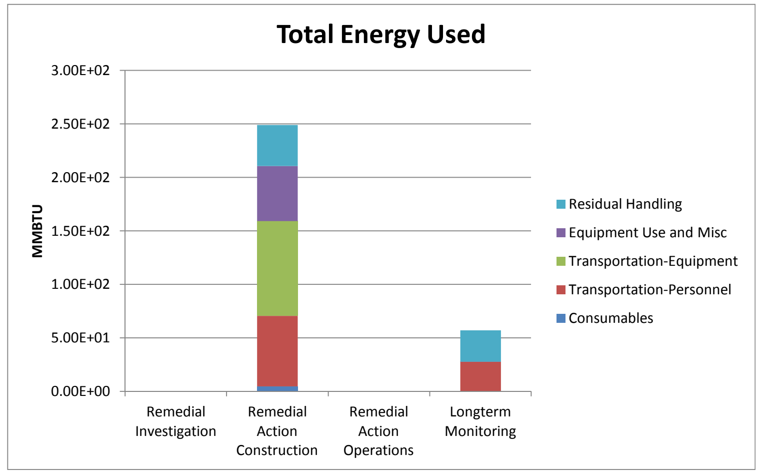
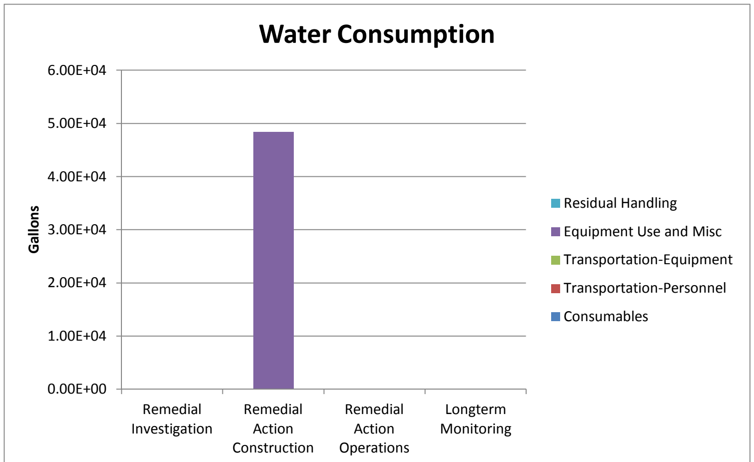
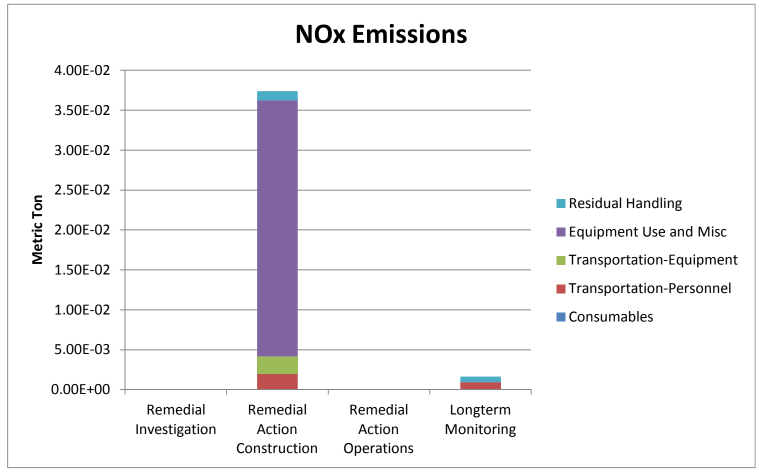


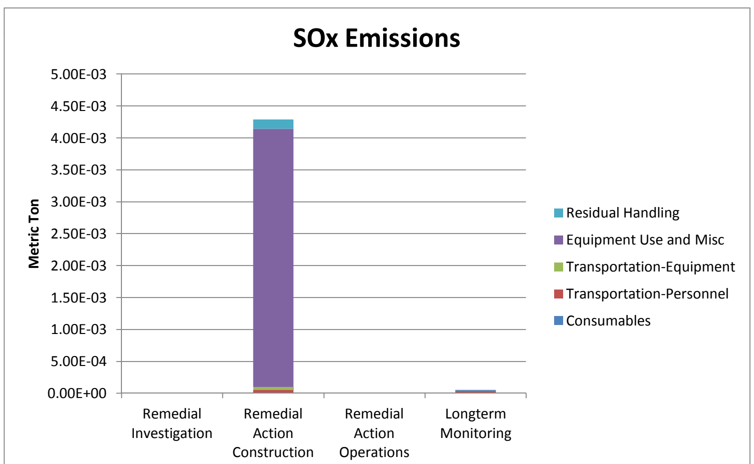
Figure J-2
Alternative 2 Land Use Controls and Long-term Monitoring Summary
Site 49 Remedial Investigation/Feasibility Study
MCIEAST-MCB CAMLEJ, North Carolina

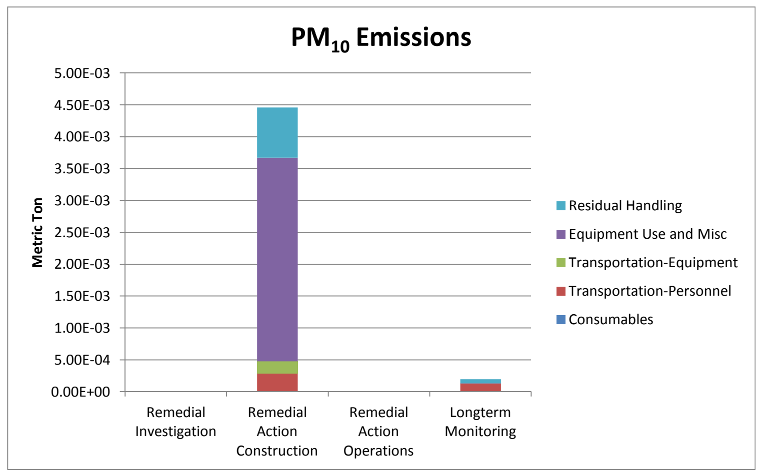


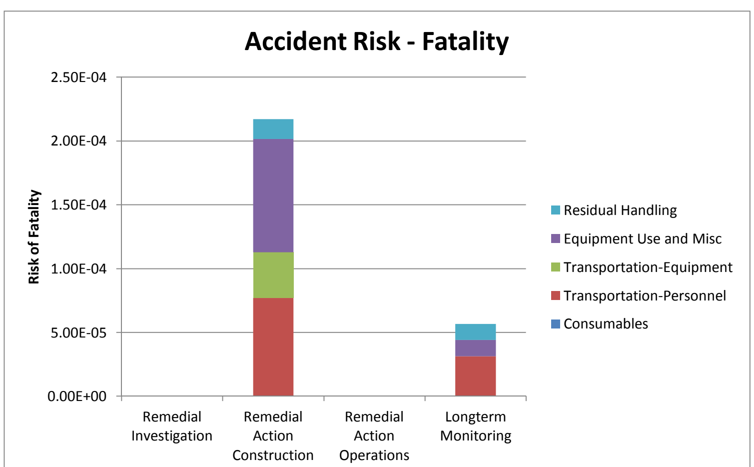












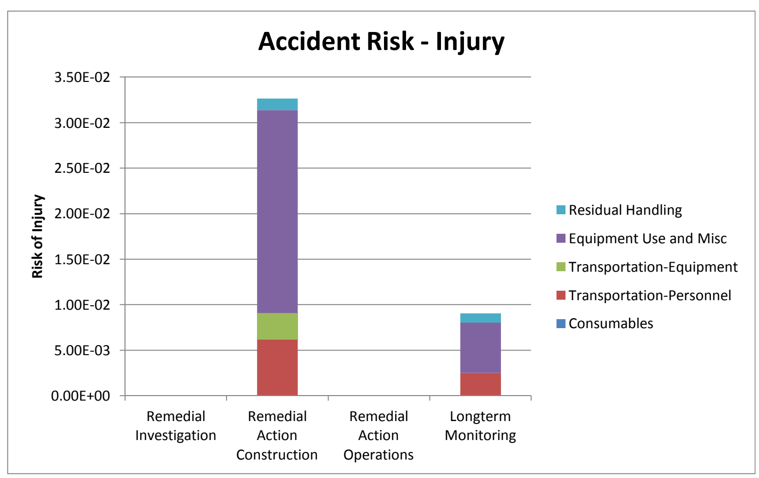


Figure J-3
Alternative 3 Enhanced *In situ* Biodegradation, LUCs, and LTM Summary
Site 49 Remedial Investigation/Feasibility Study
MCIEAST-MCB CAMLEJ, North Carolina